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Subscriptions—In the United States, its possessions, and Mexico, \$5.00 yearly; Canada, \$5.50; elsewhere, \$6.50 the year.

Advertising rates on application. All advertising must conform to American Medical Association Rules.

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Published monthly at Omaha, Nebraska, by the Magic City Printing Company.

Entered as Second Class Matter at the Postoffice at Omaha, Nebraska, under the Act of March 3rd, 1879.

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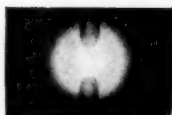
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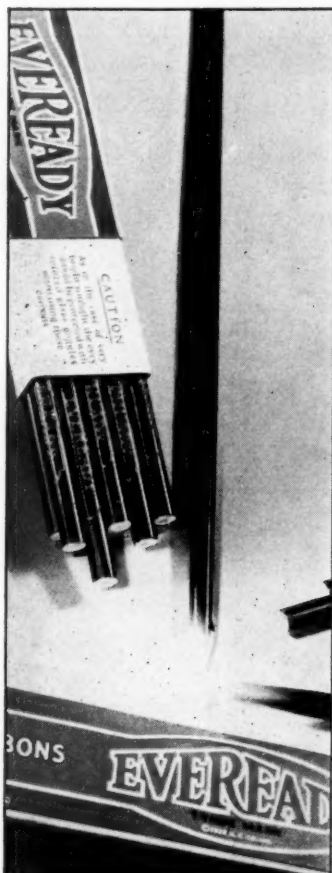
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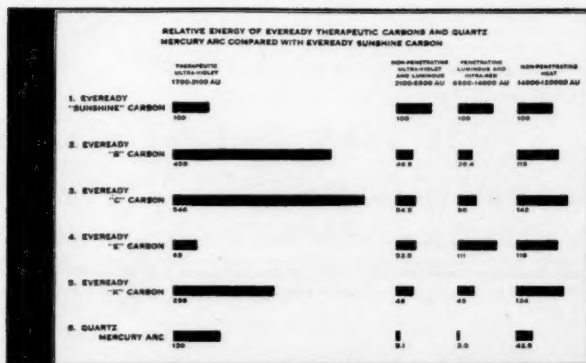
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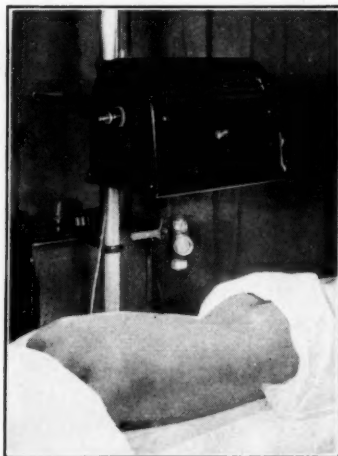
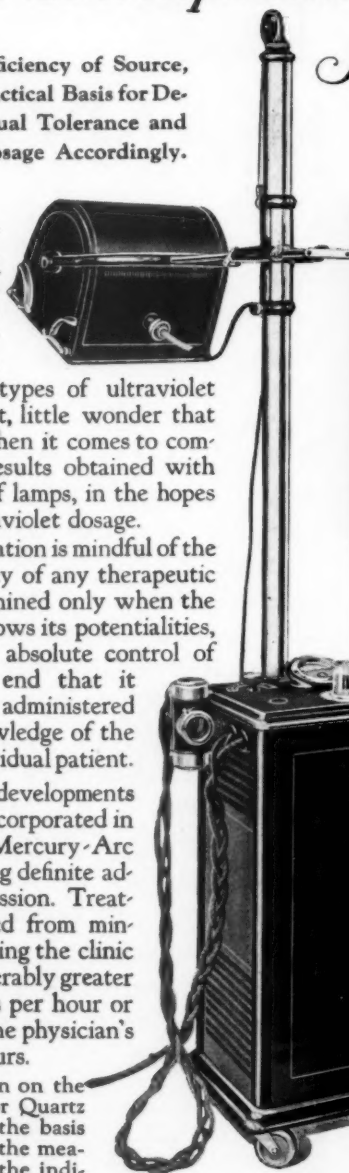
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# ARCHIVES OF PHYSICAL THERAPY, X-RAY RADIUM

VOL. X

AUGUST, 1929

No. 8

## THE EFFECT OF ZINC IONIZATION ON CHRONIC ULCERS\*

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CHICAGO, ILL.

The galvanic current was discovered by Luigi Galvani in 1791, but it was not possible to obtain the current in sufficient quantity for use outside of experimental purposes, until Volta, in 1800, invented the cell and battery which now bears his name.

The galvanic current was at first thought to be a vital fluid peculiar to the nerves, just as blood is peculiar to the blood vessels, but with further experimentation this theory was abandoned, and the various effects obtained as a result of the application of this current to living tissue were definitely established and classified.

The various phenomena produced by galvanism on living tissue, such as muscular contraction, coagulation, liquefaction of tissue, sedation and irritability, are of extreme importance. In this paper we will only be concerned with that property of the galvanic current which brings about ionization of salts in solution and the attraction and repulsion of positively and negatively charged ions.

In 1767, Sultzer,<sup>1</sup> a Prussian, noticed a peculiar taste when he placed silver joined to lead upon his tongue. This reaction that he obtained was due to the ionization and absorption of one of the metals.

Nicholson and Carlisle,<sup>2</sup> in the first decade of the Nineteenth century, decomposed water with the galvanic current.

Cruikshank,<sup>3</sup> in the same period, precipitated silver and copper from their solutions in the same manner.

Davy,<sup>4</sup> in 1807, decomposed potassium and sodium from their compounds.

Very little sound experimental work was done from this period until Leduc showed that he was able to produce convulsions in a rabbit when strychnine was applied to the animal through the positive pole.

Finzi,<sup>5</sup> in 1912, reported that by applying 10 ma. of current for thirty minutes to a solution of ferrocyanide, placed on the knee of a monkey, he obtained some absorption of the ferrocyanide ion.

Inchley,<sup>6</sup> in 1921, repeated the work done by Leduc and Finzi and in addition performed some exhaustive experiments of his own. He proved that under the influence of the electric current, both positive and negative ions are absorbed through the skin and mucous membrane, and that foreign ions can be made to penetrate the tissue for a considerable depth if the appropriate electrode is applied; after the ions are introduced into the body the current has no further appreciative influence on them although

\*Read at the seventh annual meeting, American College of Physical Therapy, Chicago, Oct. 10, 1928.

the current is conveyed through the body by means of the tissue ions.

For the sake of brevity, we shall only review the experiment in which Inchley demonstrated that ions not only penetrate the tissue, but that they also penetrate for a considerable depth.

A pad soaked with a solution of ferrous sulphate was applied for a half hour to the right side of the abdomen of a rabbit. The positive electrode was attached to the pad and the negative electrode in the form of a steel needle was inserted in the hind leg on the same side, the animal was then killed and sections were made of the parts treated. The following is the pathologist's report:

"Sections of the electrically treated tissue gave a very deep iron reaction throughout the skin proper. The supporting tissues of the subcutaneous fat was also a deep blue. The reaction was especially intense around the vessels of the skin and also on the surface where hairs were emerging. The color chiefly lay in the fibrous tissue and its special concentration in this tissue around the vessels pointed to an absorption by the lymphatic system. The cells forming the hair follicles were completely unstained. The epidermis was deeply stained. The deepest layer of fibrous tissue which showed stain was that just below the deepest layer of the skin. The staining here was not intense but the supporting tissue of the muscular fibers themselves was fairly stained. All tissues lying deeper, both the muscle layers of the abdominal wall, their supporting tissues, and the peritoneum showed no sign of coloration. The staining was thus confined to the layers. Sections of the control tissues also showed a similar distribution of color, but its intensity was very much less. The points of concentration were the same. The coloring of the individual fibers of the fibrous tissues, and the marked concentration of the iron around the perivascular lymphatics was very conspicuous owing to the general less intense coloration. The fibrous tissues of the deepest layers of the skin, including that supporting the panniculus carnosus, showed an intensity of color only a little less than that of the ionized skin. The deep muscular layers and peritoneum were again unstained. The histological evidence therefore points to an increased intensity of absorption owing to the electrical current, this ab-

sorption taking place along the same channels as in the control.

"The depth of penetration is the same in both cases, but the increased intensity of color in the electrically treated tissue is mainly superficial to the chief vessels of the skin, indicating that the action of the current is to increase the rapidity of absorption of the ion along identically the same channels as in the control, namely, as directly as possible from the skin to the perivascular lymphatics which drain the skin layers."

Thus, bearing in mind that drugs can be made to penetrate to an appreciable depth of tissue by the passage of the electric current, and that drugs applied in such a manner are much less irritant than when applied in solution,<sup>7</sup> and that ionized zinc enters into combination with the protoplasmic constituents of bacteria crippling or destroying them,<sup>8</sup> that leukocytes carry a negative charge and are therefore attracted to the anode, thus increasing the number of leukocytes in and about the ulcerated area, and also that the passage of the galvanic current, per se, has a stimulative action, we began the treatment of old chronic ulcers which did not respond to a protracted course of treatment with ordinary methods.

If one remembers the underlying pathology of these chronic ulcers, the rationale of this mode of treatment becomes evident. In brief, chronic ulcers that are not of luetic or malignant origin present the following picture.

Microscopically the surface of a non specific ulcer is covered with a dirty yellowish, gray material, which is partly lymph, partly broken down tissue and partly slough, frequently a discharge which is thin, irritating, offensive and usually not purulent, exudes from the open area. The base of the ulcer is thickened and fixed to the underlying structures. The margins are thickened and inflamed, the surrounding tissue is oedematous and infiltrated, with a sharp cut and well defined edge.

In the indolent or callous ulcer the surface is smooth and glistening and a dirty yellow color, the edges are hard and sharply cut, and are considerably elevated above the surface, while the skin is heaped up over the edge and

an abundant purulent and serous discharge exudes from the ulcer.

The base consists of extremely dense scar tissue.

The skin of the limb is pigmented and a local cellulitis associated with inflammation of the veins and the lymphatics is usually present.

In the lupoid ulcer we find the surface covered with excessive granulation, the edges are raised and infiltrated and scattered lupoid tubercles are distinguishable, these extend into the healthy tissue which is red and congested.

Microscopically one can see the formation of nodules around the smaller vessels of the skin, consisting chiefly of round cells, within which may be observed a giant or an epithelioid cell arrayed in the same way as in the tubercle. The structures around the blood vessels are infiltrated and hypertrophied, and as the disease progresses the normal tissue of the part disappears and is replaced by granulation tissue or

by a fibro-cicatrical lesion, the bacilli are few in number and are seldom found.

Ionization was used not with the idea of curing the underlying condition, but purely as a symptomatic measure.

In order to illustrate this point, the cases reported in this paper have been selected with the object of showing the benefit of ionization in ulcers whose etiology all differ from each other but which are alike in their chronicity, in being non-luetic and in that they did not respond to ordinary measures of treatment—one for a period of six months, one for a year, and one for fifteen months. The technic used was as follows:

A piece of used x-ray film was placed on the lesion and a pattern of the ulcer was made. This was done with the object of obtaining a pattern of the size and shape of the ulcer. A pattern was made preceding each treatment and in this manner it was possible to see at a glance how much granulation had taken place during the intervals between treatments. A pad of



Fig. 1

Fig. 2

Fig. 1—The ulcers at the time treatment was begun.

Fig. 2—Following the initial treatment with ionization, the lesions which before treatment were discrete with sharply defined edges have now become confluent.

Fig. 3—The lesion on the ankle is now completely healed, but because of the color of the scar tissue the photograph shows more contrast than

Fig. 3

Fig. 4

is actually present. The lesion on the tibia is now healthy in appearance and is being filled in with granulation tissue.

Fig. 4—Both lesions are now healed. The ulcerated area is now completely closed, but again because of contrasting color between scar tissue and skin the photograph shows apparent incomplete healing.

cellucotton immersed in 2% zinc sulphate solution cut to the exact size of the ulcer on which Crooke's metal, smaller in size than the cellucotton, was applied and to this was attached the positive electrode of the galvanic current; the negative pole was attached to a pad about three times the size of that under the positive pole and applied on the same side at a distance of eighteen inches from the lesion; the current was then gradually turned on until tolerance was reached. The treatments were given for a period of thirty minutes at seven day intervals.

Upon the removal of the pad the ulcerated area which before the treatment appeared to be moist now was dehydrated with a dirty whitish deposit covering the entire area. This is due to the chemical combination of the zinc with the tissue proteins.

This membrane is present for a period of five to seven days and disappears gradually by absorption.

Usually after one or two treatments the initial punched out edges become rounded, smooth with a border of healthy, granulation tissue, which eventually, on continued treatment, covered the entire ulcerated area. After a varying period of time depending upon the size of the ulcer epithelization and complete healing takes place.

We have to date treated a large series of chronic ulcers with ionization, but for the sake of brevity we will discuss three cases in detail in which patterns were cut and periodic photographs taken. These represent the most common types of chronic ulcers met with in practice; namely, the lupoid, indolent and varicose ulcers.

#### CASE No. 1

G. B., aged 19, a white boy admitted to the Cook County Hospital on June 13, 1928.

The significant history was that in the fall of 1926 while playing football he had been kicked in the left ankle by another player, following this injury the ankle became sore and painful, he then went to the dispensary where the foot and ankle were placed in a plaster cast.

He claims that an x-ray of the ankle taken at that time showed no bony involvement.

The ankle had given him considerable pain since that period and in March of the same year he noticed several open sores from which a thin fluid exuded.

On April 20, 1928, he struck his right leg against the back of a chair and a week later noticed the same type of lesions that were present on his left ankle—these gradually increased in number and size.

His previous history and physical examination was negative with the exception of the lesions which were present on his left ankle.

*Essential pathology in region of lateral Malleolus of left ankle:*

Multiple lesions that range in size of a dime to a silver dollar, irregularly circular in shape, of a reddish blue to a violaceous color, the edges are indurated and elevated, with ulcerated necrotic centers from which serosanguineous pus fluid exudes.

The essential pathology of the region over the right upper third tibia presents lesions which are more diffusive, less raised with a more violaceous border.

Because of the history of injury preceding both lesions, osteomyelitis was considered, but the x-ray findings for osteomyelitis were not present.

The Wasserman reaction was negative.

Repeated examination of material and sections taken from the ulcers were negative for tubercle bacilli, and for parasites, since lupus and actinomycosis were considered.

The following is the pathologist's report:

"Two sections of skin show a dense cellular infiltration consisting of polymorphonuclear leukocytes, plasma cells and lymphocytes in the corium, in one there is slight cornification and both show dilated lymphatics, no signs of tuberculosis or evidence of abnormal pigmentation in either specimen. But, in spite of the fact that no organisms were found it is now the consensus of opinion that the lesion is that of lupus vulgaris."



The patient was given potassium iodide internally 10 m. tid. with local applications of saturated potassium iodide, from June 13, 1928, until Aug. 1, 1928, with no resultant improvement.

Ionization was begun on that date and the condition immediately showed improvement, the edges lost their violaceous color, the discharge became less in amount and healthy granulation tissue began to make its appearance.

The illustrations show the lesions at the time ionization was begun, three weeks later, and six weeks after the initiation of ionization, when healing had completely taken place.

#### CASE No. 2

J. H., aged 62, white male whose occupation was that of a laborer, entered Cook County Hospital on Aug. 6, 1928, with the complaint of varicose ulcers on both extremities, which had been present for two years and had never completely healed.

Physical examination grossly, was negative except for the varicose ulcers.

Both legs are discolored with ulcers practically covering the entire outline of the distal

half of both legs on their medial and lateral aspects. The margins are irregular and undermined, the bases are smooth, shallow and covered with granulation tissue of poor quality.

The anterior surface of the tibia is roughened giving a sensation to the examining hand of periostitic irregularities.

*Reflexes:* The right patella is more active than the left, both Babinski and ankle clonus are negative.

There is a slight albuminuria and the Wasserman reaction is negative.

This patient was given ionization immediately after admission and following the first treatment the edges of the ulcers began to fill in, the granulation tissue began to form, and the pain which was present before entering the hospital was markedly lessened.

The illustration shows the ulcers at the time of entrance to the hospital during treatment and after closure.

#### CONCLUSION

(1) If solutions of drugs are applied at the appropriate electrodes, both positive and negative ions can be made to be absorbed.



Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 5—The appearance of the ulcer before treatment with ionization. The edges are sharply defined and undermined.

Fig. 6—A healthy granulating margin is now present and the ulcer which before treatment was deep is now much shallower.

Fig. 7—The lesion two weeks after; showing the further filling in of the margins with healthy granulation tissue.

Fig. 8—Varicose ulcer before treatment.

Fig. 9—Seven days after initial treatment was given the lesion in the center is healed and the other ulcers are beginning to granulate.

Fig. 10—The ulcers which were very deep at the time treatment was begun are now shallow and the edges in all of them have lost their sharply defined appearance.



(2) Ions so absorbed have a beneficial effect on chronic ulcers regardless of the etiology.

(3) Healthy granulation tissue and healing of chronic ulcers immediately follow the use of ionization.

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#### DISCUSSION

DR. J. E. G. WADDINGTON (Detroit, Michigan): Dr. Gries has so well brought out the subject that there is not much to add. There are just one or two things I might accentuate.

We do not have a deep effect of any ions that we try to introduce through the skin. Turrell has very clearly shown that the hydroxyl ions are the fastest in the human body and therefore we cannot expect any following ions introduced to have any effect deep within. Naturally, if you apply strychnin, you can poison a rabbit or a person. That does not imply deep penetration; it simply carries through the blood stream. I am glad the doctor emphasized the local effect we get through ionization.

When treating these cases, remember two things: Always clean off the ulcer. Remember that electricity produces better results with less resistance; the less resistance the better the electricity penetrates. If there is crust or discharge, nullify the effect of the electricity or you have to push harder to get it through, with resultant pain to the patient.

Dr. Leduc and Dr. Friel have told us that when giving ionization, give as strong a dose as you possibly can to the lesion, because subsequent treatments will be more or less irritant. As Dr. Friel mentioned in his talk, if you give a thorough ionization and get the solution in contact with all the affected tissue, one thorough ionization will cure; however, this is not always possible.

In talking about varicose ulcers, I must have seen at least one hundred ulcers of the leg in O'Donnovan's Clinic, at the London Free, and O'Donnovan brought out the point that so many of these ulcers were sent with a diagnosis of varicose, and yet there could be no varicose vessels discerned at all. The point I want to make is that we must treat not only a local condition to overcome the local infection, but in addition we must also adjuvantly look after the basic lesion that causes the ulcer, or the ulcer will not heal.

In regard to pain, I saw a case at the Royal Free, where a man had been run over by a truck, with rather disastrous results to his big toe. It took the nail off and he became infected. Zinc ionization was administered, and rapid healing resulted. It is not well to use too strong solution. One per cent is more effective than two; possibly one-fifth of one per cent might be better in some cases. The zinc ion is not irritant of itself, it is the solution; therefore have it as mild as possible when treating a very irritable lesion.

DR. A. R. FRIEL (London, England): This is a most valuable paper and I congratulate the author on the work he is doing. I am mostly interested in stating concisely what keeps a case from healing.

This comes under what I consider the third condition, sepsis on the tissue, with changes in the neighboring organ. The changes in the neighboring organ are the changes in the skin around it. If the doctor will treat the ulcer as well as ionizing it, he will get quick results.

I should like him to communicate his dose so it will be repeated all over the world.

The dosing is quite easily repeated in the case of the ear. Most ears are the same size and all we can hope for is approximately correct doses. Nearly all of us get three milliamperes for ten minutes. However, most people don't have ulcers of the same size, so it is necessary to be specific in your statement. The dose should be expressed in this way: Amperage multiplied by time and divided by the area. You can use milliamperage and seconds and c.c.'s, and the surface of the ulcer should be measured. The easiest way to measure the surface of a wound that I know of, is to take a new photographic film and press it on the ulcer and trace the outline of it, and then take one of the architect's papers with squares, put the film up against the window and trace on the film the number of squares that it covers. Each of these squares represents a definite area, either a quarter or half c. c. Then you know the area of the ulcer.

If you say that the number of units that you give the patient equals the amperage multiplied by the time divided by the area, the dose can be repeated anywhere, and you can give the same dose, corresponding to the size.

I call this unit a Leduc. If you know the number of Leducs that he gave and succeeded, you can give the same number of Leducs to any other ulcer, no matter what size it is. In other words, one Leduc equals one milliamperere times one minute divided by one c. c., or one square centimeter.

When Dr. Gries stated what dose he gave and stated the size of the ulcer, it could be repeated anywhere.

I would make one other suggestion: After what dose does the ulcer become sterile? There are two stages at which it should be investigated—immediately after ionization by a culture medium, and by making a slide on a subsequent day. I think making the slide on a subsequent day is the more important. The activity of the tissues, aided by the antiseptic effect of the zinc ion, would produce sterilization, and if this takes place on the following day I think we should know it.

I congratulate the doctor on the valuable work he is doing.

DR. J. H. HENDREN (Straight Creek, Kentucky):

In regard to zinc ionization, I have found that a mixture of copper and zinc sulphate will give you a better result than either one of the two salts alone. I use a 1 per cent solution of copper sulphate and a 1 per cent solution of zinc sulphate; the two salts mixed. You don't have to weigh it out. If you take an empty battery cell of a common flashlight battery, it will hold about the approximate amount of each salt to make a 1 per cent solution in a gallon of water. Fill the empty flashlight battery cell with zinc sulphate, put it in the gallon of water, fill with the copper sulphate and put it in the same gallon and you have approximately a 1 per cent solution of each.

In a few ulcers, it is necessary first to put on a few drops of a local anesthetic, butyn or novocain, novocain being my preference. Wherever you have pus with drainage, you have an indication for the positive galvanic pole with zinc-copper ionization. It can be used

in the lung conditions after a resection of the rib, and will give splendid results. Introduce it into the cavity with a syringe and put in your positive electrode and give the treatment. Remember, gentlemen, pus *with* drainage. The only treatment for pus without drainage is to incise it open with a knife. Pus with drainage is a positive indication for the positive pole.

DR. J. R. ALEXANDER (Charlotte, N. C.): I have enjoyed this paper very much indeed. I have used ionization a great deal, especially in leg ulcers, and it has always produced good results. There is just one point I wish to make that I think probably the doctor omitted, that is the dressing afterward. We wish to prolong the ionization, and we should use a dry dressing. I prefer to use simply bismuth, subnitrate of bismuth.

DR. LOUIS GRIES (closing): It makes me very happy that Dr. Friel is here today. I feel very grateful for what he has said about my work, for he is really the father of ionization.

I should like to have this point left in your minds, that after all is said and done, when we use the electric current to get certain effects, we can consider it in the same fashion as a new drug. If a new drug is placed on the market, the pharmaceutical house sends you a description of the drug, it sends you the action that this drug will produce, and then it is up to you, as physicians, to know the indications and contra-indications for the use of the drug.

You have been told in this paper what ionization will do, what phenomena it will invoke, and it is a drug with which very much good can be accomplished.

As to the dressing, we take a piece of mosquito screen and wrap a piece of adhesive around it and place it on the wound, and over the screen we place the dressing. Formerly, instead of using bismuth, we used a piece of gauze, and just took an applicator with some sterile vaseline, covered up the gauze and placed it over the wound, serving as a preventive against irritation.

## THE TREATMENT OF GYNECOLOGICAL CONDITIONS WITH LOW-VOLTAGE CURRENTS\*

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In recent years, conservatism in medicine has been the plea of the profession; as a result, more sane methods of treatment have been introduced and radicalism has passed into oblivion. While additions are being constantly made to the *materia medica*, yet there is less of "drugging" at the present time than in the past. Again, though more surgical instruments are being devised, many surgeons are reverting back to the simpler ones, because radical surgery has seen its best days. Physical therapy, now at its peak, presents many new agencies for the treatment of human ills, and most of its followers are returning to the simpler ones for the best results.

The low voltage currents were among the first to be introduced for the cure of human ills, but were side-tracked for the new. Now, with more confidence than ever, these currents are being revived and bid fair to be extremely efficient in the treatment of disease. Surgery replaced these, but the skillful operations of the surgeon have not been a panacea for nature's ills. Nature, itself, is a wonderful physician, and, with a little help, will do much to correct and repair the "broken frame." Many gynecological conditions can be relieved and cured with the low voltage currents, and the treatment is both simple and conservative.

When we speak of low voltage currents, we allude to the galvanic and sinusoidal ones, and with these much can be done. These currents are the great boon to the so-called borderline cases—cases which cause the patient much trouble and discomfort—yet the pathological condition does not warrant radical treatment. Thus, much hazard and suffering can be removed if these currents are applied.

The galvanic current is spoken of as the direct current because it has a definite polarity.

\*Read at the seventh annual meeting, American College of Physical Therapy, Chicago, Oct. 10, 1928.

It flows in one direction and is a constant current. Each pole has definite action. The positive pole is acid in reaction and sedative in effect. It hardens and contracts tissues, and acts as a vasoconstrictor, arresting hemorrhage by its styptic qualities. It dehydrates and dries tissue and also allays inflammation. The negative pole is alkaline and caustic in effect. This pole softens and relaxes tissue. It is a vasodilator and increases hemorrhage. It softens scar tissue and fibrosis. Both poles possess ionizing power and chemicals can be introduced into the body as desired, provided the correct pole is used to bring about this effect.

The sinusoidal current is an alternating one and has no polarity. The sinusoidal has no chemical action, and its effect is strictly mechanical, stimulating muscle and nerve tissue. It furnishes cellular massage and increases metabolism, secretion and excretion. It resolves stasis and tones up both striated and non-striated muscle. It furnishes exercise to sluggish organs whose muscles and glandular tissues have remained dormant, causing them to function normally.

Having explained the action of the low voltage currents, their application to the human organism can be discussed in reference to gynecological conditions; but first the causes of diseases in women should be considered.

First of all, the most common are constipation and infection; posture and anatomical defects play an important part, but the first named are responsible for a larger percentage of woman's ills. Constipation alone, if overcome, will clear up a number of pelvic conditions. Women, as a rule, are constipated, due to sedentary life and their disregard of the so-called "habit time." Those who work in stores and offices cannot have regular habits, because their business demands all of their time. Also, in the cities, women live great distances from

their work, and much time is consumed in going to and from their places of employment, which accounts somewhat for this neglect. However, regardless of the cause, constipation is responsible for numerous pelvic conditions.

Infection comes next to constipation as a cause for pelvic inflammation. Neiserian infection, once implanted, causes much havoc. The trite saying that "man knows where it begins, but God only knows where it will end," still holds true. However, with the introduction of physical therapy in the treatment of this disease, some ray of hope is held out for these sufferers. High frequency, along with the low voltage currents, has done much to check unpleasant results of Neiserian infection. Faulty posture, injuries at childbirth, neglect at menstrual period and dietary indiscretions may be mentioned, because it is necessary to remove the cause before any satisfactory treatment can be instituted.

Having briefly discussed the causes, the apparatus needed for treatment of gynecological conditions should be mentioned. Any standard galvanic machine can be used. These have been so improved that several currents are derived from the same machine. Some have numerous combinations, whereby any sort of current can be applied without changing electrodes. As combination treatments are necessary in many cases, it is of advantage to have a machine that will deliver these several currents. Besides the machine, a good assortment of electrodes must be had. These should include pads of various sizes and shapes, along with zinc, copper and silver uterine electrodes; carbon ball, copper ball and copper and carbon rectal and vaginal electrodes. The electrode should suit the case, and not make the case conform to the electrode. More efficient work can be done if the pads and electrodes are applicable to the case.

The gynecological cases treated are: Dysmenorrhœa, leukorrhœa, ammenorrhœa, menorrhagia, metrorrhagia, cervicitis, endocervitis, endometritis, subinvolution, malpositions of the uterus, fibroids, erosions of the cervix and urethral caruncles. Constipation, hemorrhoids, and anal tissues cause reflex symptoms, referable to pelvic disease, and may be mentioned because

they can be admirably treated with the low voltage currents. Again, there are many other conditions which show no pathological changes, as ovarian neuralgia and vague pain arising in the plexus of nerves in the broad ligament; these and other obscure pelvic pains can be relieved with these currents.

The technic of application is extremely important. Dysmenorrhœa, leukorrhœa, ammenorrhœa, menorrhagia and metrorrhagia are considered just symptoms, yet they, in themselves, demand treatment. These cases, regardless of cause, yield to positive galvanism and the sinusoidal currents. Dysmenorrhœa, unless of endocrine origin, is treated by positive galvanism, along with the sine current. The treatment consists of a uterine electrode placed in the cervix from the external to the internal os, attached to the positive pole of the machine, and the negative one is connected to a large, moist pad on the abdomen. Should the cervical electrode be difficult to introduce, use the negative pole for a few minutes, and it will then slide in easily. The current should be fifteen to twenty milliamperes, and the time should be fifteen minutes, after which rapid sinusoidal is given for five minutes. The treatments are given three times weekly until the menstrual period appears, at which time the treatment should be discontinued for a period of ten days after menstruation. Treat over a period of three menstrual cycles and the dysmenorrhœa is cured.

Cervicitis and endocervicitis are treated in the same manner. The electrodes may be of either zinc, copper or silver alone, or amalgamated with mercury. It will be found that some cases yield to one metal better than another, and should the case show no improvement after several treatments with one, change to another. Cervical erosions are best treated with silver stem and cup electrodes. Silver has an almost specific action in such cases. Menorrhagia and metrorrhagia are treated similarly, using a copper or an amalgamated copper electrode. It often happens that the cervical canal is too large for even the largest cervical electrode, and in these instances the copper ball electrode, covered with wet cotton, is applied under the cervix and the current directed through the entire



uterus. When the uterus contracts, the cervical electrode is used. Follow this treatment with a few treatments of sinusoidal current, and these cases are relieved.

Leukorrhœa, while classified as a symptom, demands some form of treatment. In spite of removing the many causes, an unpleasant discharge remains, which worries the patient to the extent that she becomes alarmed over her condition. The patient has used all manner of douches and suppositories; she has had much local treatment, but the discharge is still present. Her general health has been built up; she has taken all sorts of exercises, but her condition remains the same—all of which has a bad mental effect on the individual. Positive galvanism, along with the actual cautery for deep destruction of glands and inverted epithelium, will bring about a cure.

Fibroids, if not too large, can be treated with positive galvanism. If they are larger than an average grape fruit, x-ray or radium is the better treatment; otherwise, the period of treatment is so long that the patient will get discouraged and quit before the fibroid is cured. In the smaller type, galvanism will efficiently reduce them and bring about a speedy cure.

Urethral caruncles, hemorrhoids and anal fissures disappear after using positive galvanism. These are all done under local anesthesia in the office, and no undue pain or loss of time is experienced. The part treated is anesthetized and a moist pad placed on abdomen or back of patient. A zinc wire attached to a suitable handle is inserted in the part and allowed to remain until the tissue around the needle turns an ashen color. The time and current vary with the size of the growth; usually five to seven milliamperes for two or three minutes is sufficient.

Subinvolution, malpositions of the uterus and prolapse are treated with the sinusoidal current. The technic is to place a large pad on the abdomen and use a large vaginal electrode which fits snugly under the cervix. The current is given to tolerance for ten minutes, first using a straight, rapid current, finishing with a few minutes of surging which gives a better tonic effect. In cases of prolapse, which presents

erosions, and cervicitis, positive galvanism must be applied to clean up these conditions.

The treatment of constipation, which, it was stated in the beginning, plays an important part in causing pelvic disturbances, is with the sinusoidal currents. Also, the patient must be given the proper diet and exercise, along with the surging sine current. A large pad is placed on the abdomen and one in the rectum, connected by a bifurcated cord. The other electrode is placed along the spine, covering from the fifth to ninth dorsal vertebrae. The current is given as strong as can be tolerated, and it must be strong enough to cause perceptible muscular contraction; otherwise the treatment is a failure.

The contra-indications of low voltage currents in gynecological conditions are acute pelvic infection and malignancy. These conditions should not be treated with galvanism. Cancers are best treated with electrocoagulation or radium, while acute pelvic infection yields to diathermy. With these two exceptions, all other conditions are benefited by the low voltage currents.

The results obtained through the use of the low voltage currents in gynecological conditions are extremely satisfactory and lasting. A great advantage is that the normal function is preserved, which is not the case after surgery, radium or x-ray. The treatments are simple and the apparatus is neither expensive nor elaborate. The treatments are painless and are given in the doctor's office. The patient has little to do in the treatment, which has a very happy psychological effect, and she suffers no loss of time from her social or household duties.

With all the simplicity, however, the physician must be skillful in selecting and placing the electrodes and choosing the right current. He must make a careful and accurate diagnosis and have a knowledge of the normal, as well as the abnormal, before he can treat such cases safely. Just merely to place this electrode here, and that electrode there, and turn on any sort of current, will not cure the case. Such haphazard and careless technic is responsible, in large measure, for failures in physical therapy. Yet, on the other hand, if a correct diagnosis is



made, and the proper electrodes and currents are used in a scientific manner, the low voltage currents are extremely valuable in the treatment of gynecological conditions.

#### DISCUSSION

DR. A. D. WILLMOTH (Louisville, Kentucky): I have listened with a great deal of interest to the essayist, because this is a subject in which I have been interested many years. I came to the conclusion years ago that the pendulum of surgery had swung too far, that we had gotten to the point where too much surgery was being done and too many organs were being removed that were not necessary to be removed and which clinically were proven not to cure the patient later on.

Through the influence of my fellow-townsmen, Dr. Pope, and the late Dr. Massey, I began a number of years ago my gynecological work with an ordinary battery instrument. From that I went to a wall plate, and from that to the ground-free instruments. I know of nothing that can be used that will be of more service to you in gynecological work than the proper use of the low voltage currents. They will do for you what you cannot do with medicine. If you can do it with applications of medicine, they are long and tedious, and either you or the patient, or both, get discouraged and the treatments cease for that reason, and the result is that the patient goes to someone else.

It is not often that I find that I have to disagree with Dr. Walke, but there are some assertions that he made this morning that I cannot subscribe to. First, he spoke of a correct diagnosis. That is certainly all-important in any condition. That is the all-important thing.

There are some other remarks that he made, if I understand them correctly, that I wish to disagree with, and one is the presence of so-called corporeal endometritis. There is no such pathological condition today recognized in the female. That was the teaching that I received and the teaching that he received a number of years ago, but remember when you have the endometrium of the body of the uterus involved, there is always involvement of the muscular structure likewise, and never limited entirely to the mucosa of the uterus. Therefore, we have gotten away from the term corporeal endometritis. It is metritis. It is different in the cervix. While the cervix is part of the uterus, it is an entirely different anatomical structure altogether.

The doctor referred to the question of the treatment of dysmenorrhea with a positive galvanism. He says I understood him correctly. Then I will take issue with him. I don't see how you are going to benefit a case of dysmenorrhea with positive galvanism. That will make it worse, in my judgment. You are certainly going reverse to the physiology of

the condition. If you want to relieve a dysmenorrhea, you have to attack it in another way; at least I think so, and I do so. Most dysmenorrheas are the result of an endocrine imbalance, together with the nervous manifestations that go with it that are localized in the so-called focal symptoms in the woman's pelvis.

I want to disabuse your minds of another thing, and that is a so-called obstructive dysmenorrhea; that does not exist, either. It never did exist. The menstrual flow takes place at the rate of four drops per minute. Can you perceive of an os so tight, unless it has been sealed with cautery or some other method, that would obstruct four drops to the minute? I can't. We have learned long ago that dilatations and the so-called curettage, that was so frequently performed, seldom relieved these cases. They got better for a time or so, of course, because you simply stretched the terminal nerve filaments—that is all you did. You did not relieve the obstruction. You simply stretched the terminal nerve ends, and as soon as they could get back to anywhere near normal, the same condition prevailed.

The doctor also referred to the question of diathermy in pelvic infections, and I want to combine that with his plea for a correct diagnosis, and think of the two together. I wish to warn you about applying diathermy on women's pelves that are infected. If you apply it on a pelvis that is infected with a streptococcus or an active colon bacillus, you are certain to have some trouble, and serious trouble.

The essayist may say, "Well, I meant Neisserian infection."

Cauteries in the cervix: The use of the cautery in the cervix was introduced by Dr. Guy Hunner a number of years ago, and his instructions were to treat the cervix that could not be otherwise relieved with medicaments. The cautery went out of existence because it has been found to be an ineffective method. We got away from the cauteries and went to low voltage currents. We treat now with mercury-copper amalgamated electrode or the zinc that the gentlemen have been talking about, or the silver electrode. Ionization is more effective.

You can relieve cases of endocervicitis with a silver electrode; you can ionize the silver into the tissues more easily than you can ionize copper or zinc, because silver is the basic metal on which the chemists base the voltage and the amount of current that is used for all of the electroplating. It is all based on the valency of the silver salts and not on the copper or nickel he is going to plate the metal with. You can ionize with mercury. Nothing, however, is better for cases of endocervicitis than copper mercury amalgamated electrode that Dr. Massey told you about a number of years ago. It is just beginning to come into its own.

The doctor referred to the sinusoidal current. Here again I am going to disagree with him. My understand-

ing of the sinusoidal current is that you get a contraction but it does not last long. Positive galvanism is lasting. How do we think of positive galvanism? Positive, acid, sedative, and sticks. It is a long current in its activity. You contract the uterus down hard with the positive galvanic pole, but you are not going to do it with 10 or 15 milliamperes. You must use at least from 50 to 75, sometimes 100 milliamperes to contract the uterus down. It cannot be done with 10 or 15 milliamperes. It can't be done any more than you can take a picture at six feet distance with an x-ray machine with about 10,000 volts. It won't go that far. You must give enough current here, over 15 or 20 minutes, to contract the uterus down, and if you do that with a few treatments, you will get effects from it; otherwise you will not.

Constipation: Here is one of the places where low voltage currents and the sinusoidal will give some splendid results. Our method of using the sinusoidal current in constipation is by placing both electrodes posterior. Go posterior about one inch below the lower border of the scapula, with an electrode on either side, that is about one and a half inches out from the spinous processes, and the electrodes not to exceed inches in diameter. Why do we put them both there? The old way was one in front and one behind. If I want to affect any part of the anatomy, I must affect it through the nerves that innervate that anatomical structure and I get on to the sympathetic by getting on the plexus behind and just below the tip of the scapula, opposite almost the seventh dorsal vertebra. If you want to know whether you are right or not, start your machine and don't have it interrupt more than nine times a minute. Alvarez has taught you that. Start your current and increase it up to the tolerance of the patient and ask if you are getting any effect in the intestinal wall; they can tell you. If you are not, your electrodes are not placed right; move them, and when you do you can make that patient's bowels move.

DR. J. E. G. WADDINGTON (Detroit, Michigan): I want to come to the essayist's assistance. Dr. Willmoth said that pelvic infections contra-indicated diathermy, but he did have the grace to add that Walke meant Neisserian, but even then he didn't agree with him. I have had the advantage of spending several days with Dr. Cumberbatch and Dr. Robinson in London. Dr. Cumberbatch showed me his technic in treating Neisserian infections in the female. He said that when he put in the cervical electrode and turned on the current, if the patient complained of pain he immediately stopped, but he did not stop the treatment entirely; the pain was an evidence of salpingitis. He then inserted a cylindrical vaginal electrode well up in the *cul de sac* and gave a mild diathermic current, giving that twice a week until the symptoms subsided. He said they invariably did. Then he changed to cervical.

The second thing is that Willmoth took exception to Walke in regard to sinusoidal currents. There are certain modifications of the sine where the peak con-

traction is maximum and it holds on, and you can hold it on for quite a period of time, several seconds, if you wish, and then reduce the current. You do get quite a contraction. Many men would, however, prefer to use the static.

DR. V. SIMMONS (Shreveport, Louisiana): In speaking of Cumberbatch and Robinson, his associate, I have here an article written by Cumberbatch, and I want to read just three paragraphs:

"Rapid subsidence of inflammation of the tubes and ovaries takes place and usually after four or five treatments given during ten to fourteen days, the treatment of the cervix is proceeded with." The "proceeded" is an English term; it means relieved.

The second paragraph: "As far as I know, no case of gonococcal salpingitis will fail to subside under this treatment. The pus tubes disappear under the ordinary methods of treatment and all the symptoms are relieved.

"The foregoing remarks apply equally well to cervicitis and salpingitis, due to infections other than gonococcal, except that the time required for the final result is perhaps longer."

That is diathermy.

DR. CURRAN POPE (Louisville, Kentucky): The gentleman has spoken about Dr. Cumberbatch's utilization of the current in determining the question of a pyosalpinx. I should like to call his attention to an article written by a physician from Brooklyn, a Dr. Buckmaster, that was published in 1891, who used the galvanic current as an absolute diagnostic means of telling whether he had pyosalpinx. Dr. Kellogg wrote about it a year or two later, and just about that time I indulged in it myself.

Dysmenorrhea is not, strictly speaking, a uterine disease in the sense of a disease of the uterus. It is a neuromuscular storm that has many factors in its make-up. Personally, I have used both the positive and the negative pole. Close to the period we should never use the positive pole; close to the period we should always use the negative pole in the cervix. The surgeon and Dr. Willmoth, say you won't ever go through the internal os. Yes, I do. If we go through, just inside the internal os, with the negative pole, we produce dilatation. Just like you dilate an anus with a fissure. The negative pole relaxes, relieves spasm, increases circulation, promotes flow.

I was very sorry to hear that he did not mention adhesions. Among the things that the galvanic current can absolutely do is to rob the surgeon of operating on adhesions and bringing about results that are absolutely beyond relief. I have never had a case of mine operated on since the time when Buckmaster showed me how to treat pelvic adhesions.

I use a bifurcated pad; a large pad on the abdomen and a very large pad on the back, anywhere on the

lower abdomen and the lower back. Those are diffusing electrodes because I am going to use a very large current, great harm will be done if the positive pole is used inside. Use the negative pole and give from 75 to 150 milliamperes, and in that way you will break up adhesions.

In the administration of the galvanic current in gynecology (and I do this work every day of my life) I nearly always employ with it the faradic current. I use a coil of 15 wire, a coil of 22 wire and a coil of 36 wire, made by Wade and Bartlett. I can produce with the 15 wire profound muscular contractions; I can produce a sedation and a mild contraction with the 22 wire, and profound sedation with a 36 wire, relieving pain almost within a moment. A little coil no longer than four inches will light up the average high vacuum Geissler tube, so you know it is a very high tension coil.

I believe I was the first person who ever suggested copper mercury curettement, or stripping of the mucous membrane of the cervix. It can be done, as Dr. Willmoth has said, and can be done nicely, and if you have any bleeding after it, which will very frequently occur, it does not make any difference, the amount of blood lost is nothing, it helps to decongest.

There are two substances that are very, very valuable to get off; tenacious green and white substance that sticks to zinc and sticks to copper. So we first wash it with sapollo, and that gets off a good deal of it, and then we polish it with the finest emery paper that we can buy.

About spongiopilin, absorbent cotton, and all of those things. There is nothing better than a bolt of white toweling. Have it made into little short towels, bound on the ends where they are cut, and I have three or four hundred of them.

I make all my own electrodes. I take asbestos; I saw it out the proper size and cover it with the rubber and put the linen cover over it, and keep those wet all the time in a basin. We take some soap and scrub it thoroughly and let hot water run over it. We take a towel, wring it out of the hot water, lay it on the abdomen, put on the electrode and have a way of keeping things clean without any trouble.

DR. FREDERICK MORSE (Boston, Mass.): I spoke to you of the importance of recognizing sigmoid impaction and sigmoid distortion. Many times the sigmoid is distorted up to the transverse colon, so much so that we have a massed impaction around here, and that massed impaction is sufficient to keep up a continuous toxemia, plus pressure.

We know that all pain is due to pressure, and that pressure may be direct or remote. In my long experience of treating intestinal stasis as one of the factors of the trouble, I have come to recognize, other things being equal, that just in proportion as we relieve either

the cecum here or the distorted sigmoid, we are relieving many cases of menstrual disturbance, it may be profuse, it may be painful, or it may be scanty.

It was called to my attention first by patients who told me that every other month when they menstruated they had a painful time, and on the principle that one ovary functions one month and the other ovary the other month, possibly they were right. There must be some pressure. You see it quite often, more especially in the sigmoid. After that had been straightened up physiologically, constipation had been relieved and the patients told me that they did not have the painful menstruation, without having had any direct treatment for that particular condition. After having recognized that and seeing it so many times, and over a period of so many years, when I have cases of dysmenorrhea, a prolapsus, whether simple or otherwise, I always try to find out where the colon is. Such a large proportion of relief and symptomatic cures have been brought about by the restoration of the position of the organ, that I think I can say it should be considered. So many times a patient comes with cystitis, having much trouble with uterine displacement, hemorrhoids, etc., and when this is relieved, they get better. That is a feature that I don't think should ever be overlooked.

The word sinusoidal evidently is not understood. If you mean a rapid alternating sinusoidal and apply it to the part, you have something that enables you to go in and do all forms of mechanical manipulation without having any deleterious effects. But when you use the word sinusoidal, you are simply reversing the galvanic current and you are not getting anywhere. All the gentlemen who have spoken have pointedly remarked that you must appreciate and respect the effect of the positive or the negative poles. When you reverse a sine current, that cannot be used on mucous membrane because of the effect from the electrode itself. When the doctor spoke of sinusoidal, he meant that.

The doctor speaks about the uselessness of using a rectal electrode when we have so many spinal nerves. I have used the fluoroscope very much and have tried out all of those things; I have read Alvarez' book and have great respect for him and his wonderful work, but I have yet to get my results by treating through the back or through the abdomen when I can get it through the rectum. If the patient does not prefer the rectal electrodes, treat the muscles lengthwise. When they are treated lengthwise, the constipation is relieved.

This is not a theory, it is an actual fact, proven by experience.

I want to confirm what Dr. Willmoth said about the use of the negative pole in the cervix instead of the positive in the treating of dysmenorrhea. I think there are lots of children that would have been born if we had not produced an electrolysis in the cervix.



I have given patients barium by mouth, put on the alternating rapid sinusoidal; I have had them take barium enemas and put them through the different motions, and I have seen a reproduction of all those motions. I have tried it through the spinal area. If you wish to treat the part where the trouble is, you have to treat the angle where the muscle area is affected, rather than take a mouth wash for a tooth that has to have a special filling.

You cannot localize the effect unless you use it over the part.

DR. FRANK H. WALKE (Shreveport, Louisiana): Whenever a wonderful discussion of this kind has been brought out, I feel I have presented a subject worth while.

When Dr. Willmoth spoke of corporeal endometritis, the word was left out, it was conspicuous by its absence, because I don't believe there is any such thing as a corporeal endometritis. There is metritis, an inflammatory condition of the muscles, and it was purposely left out.

My paper was on low voltage current and we could not go into the merits or demerits of diathermy, whether it is good or whether it is bad. For that reason, the gentleman was much out of order.

I believe in the actual cautery. If you read the works of a number of men, Kelley, and Gans, who have studied these cases of leukorrhea or endocervicitis, you will find that they have discovered that where you have erosion around the cervix and a discharge for a considerable time, you have a piling up of stratified squamous epithelium. The columnar epithelium cover down to a certain point and then joins with the stratified squamous. Under continuous irritation of inflammation and discharge, nature strengthens that stratified squamous epithelium by placing layer on top of layer. It curls under itself and that smooth, glassy effect that you see just outside of the actual erosion of the cervix. Right at that particular point is where the smooth, shiny, apparently healthy mucous membrane is, against the eroded area. The reason for that is that the stratified squamous epithelium has piled up upon itself and it must be destroyed. With the cautery which we have today you cut through and don't even stop the bleeding.

That, however, destroys the mucous membrane to the point that the erosion will heal.

The method of burning from the internal os to the external os, with a red-hot iron cautery, or whatever you may use, should be condemned. If he could see the keen little electrodes that we use, he would see they were not hot enough to actually coagulate the blood and prevent hemorrhage. It looks more like a knife cut, but in a few days or three week's time that cervix is as smooth as it can possibly be.

It is impossible to determine if fibroids will develop into malignancy or not. When I mentioned one as large as a grapefruit, I don't treat those cases with galvanism. I should prefer surgery at that particular time. But those small fibroids that are found in the cervical portion of the uterus which you can feel on digital examination, and which produce a certain amount of irritation with dysmenorrhea, menorrhagia, or metrorrhagia, these are the type of fibroids that yield to the treatment of positive galvanism.

In regard to our sine current: Along with the positive galvanism in the treatment of dysmenorrhea you know what effect the sine current has on a neuritis. Rapid vibrations for pain in the arm produces relief. The same thing applies to the cervix.

I never got any results treating constipation through the back. I will admit that my technic is faulty. I started using the method described by Dr. Morse and in my hands that has worked better than through the nerves.

Dr. Pope spoke about dysmenorrhea in which he mentioned the condition as being neuromuscular, probably of endocrine origin. If it is neuromuscular, I can't figure out why positive galvanism plus a sinusoidal would not overcome the condition. Probably that is where we get the best results.

He spoke about not giving it close to the period. Neither would I give it close to the period. When they come in and are expecting the period in a few days, I give them sinusoidal current only and have them come back ten days after the period has ceased. Those are fire points of technic that you cannot bring out in a paper.

## PHYSICAL THERAPEUTICS IN PERIPHERAL NEUROMUSCULAR AFFECTIONS\*

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The ultimate value of any form of therapy used in the treatment of disease is dependent upon, and determined by, a full knowledge of three factors: first, the normal physiology of the part to be treated; second, the existing pathology; and third, the therapeutic aid to be administered.

Because of the limited time at our disposal, we must assume a fairly definite knowledge of the physiologic properties of muscle and nerve. A normal muscle depends upon contractility, irritability and conductivity for its normal function; while a nerve depends upon conductivity and irritability. In the treatment of these conditions the low-volt or low-tension currents are the chief agencies to be employed. They are direct currents, commonly called galvanic, and the flow of current is constant from one pole to the other. The faradic current, while of low voltage, is an induced current, so that it is really a type of alternating current. Sinusoidal currents are low tension currents in which the current flow begins at zero potential, ascends gradually to a maximum in one potential, returns gradually to zero to ascend to a maximum in the opposite potential, and again returns to zero. This constitutes one cycle, and the curve described by each phase of the cycle is a true *sine* curve. The galvanic current derives its benefit from chemical changes produced in the tissue, while sinusoidal currents benefit through muscular action with slight, yet definite, trophic results due to the polarity effects of the constant current. In the alternating type of sinusoidal currents, the polar variations take place so rapidly, (usually 180 cycles per second), that the trophic effect is not in evidence.

A normal muscle contracts at each make and break of the galvanic current, the cathode closing contraction (CCC) being greater than the

anode closing contraction (ACC). The normal nerve responds to the action of the faradic current. Any injury to a nerve causes some loss or alteration of its conductivity, and, as a result, the muscle supplied by the involved nerve is thus separated from its trophic centre in the cord and loses its normal physiologic powers of irritability, conductivity, and contractility. Paralysis, rapid wasting and impaired circulation of the muscle ensue. A characteristic response to electrical stimulation results in what is known as the reaction of degeneration, and which is classified by Erb as being partial, marked, or complete. In partial degeneration, the ACC may be equal to the CCC, or it may be slightly less or slightly greater than CCC. This is the condition found in minor lesions and is accompanied by a quantitative loss to faradism. Marked reactions of degeneration, such as occur in peripheral paralyses, exhibit a complete loss of faradic irritability with considerable variations in galvanic irritability, but the resulting contraction is always slow and sluggish and passes off gradually. While each pole may produce an equal reaction, more often we find the characteristic reaction in which the ACC is greater than the CCC. In complete degeneration, faradic stimulation produces no response, the response to galvanic stimulation being slow, of long duration, difficult to produce, and the contraction produced by the anode being always stronger than that produced by the cathode.

This discussion is based on a study of a group of cases variously diagnosed as neuralgia, neuritis, sciatica, lumbago, and other myalgias. We recognize neuralgia as a painful condition along the course of a nerve distribution, without pain in the nerve itself, unless accompanied by a true neuritis, which may be relieved in some cases by pressure upon the nerve. Probably the most characteristic, and undoubtedly the most painful form of neuralgia, is *tic douloureux*. The

\*Read at Seventh Annual Meeting, American College of Physical Therapy, Chicago, Oct. 11, 1928.



pain is sudden in onset, of most excruciating character, and occurs in spasms lasting as long as two minutes. One important, diagnostic feature is the fact that the patient rarely points his finger toward the affected side for fear of touching it and precipitates a paroxysm of pain. Only in this way does it differ from other neuralgias in diagnosis. While neuralgia in any form is a definite clinical picture, it is not a definite clinical entity; our treatment therefore must be purely symptomatic. While it is true that a slight external stimulus such as heat may bring on an attack, it has been our experience that heat is a very necessary part of the treatment of *tic douloureux*. It should be applied very gently at first, and increased gradually, to exert a mild sedative effect in order to improve the local blood supply. In the milder cases it often is helpful to use twenty to thirty minutes of diathermy, but I believe radiant heat and light with the subsequent application of positive galvanism to be better, using a small spongiopylene electrode placed immediately in front of the ear and below the zygoma, with the larger indifferent electrode over the back. The current should be just strong enough to be felt by the patient and should be continued for ten to fifteen minutes at the first sitting, and increased gradually to thirty or forty minutes, after the third or fourth treatment. An alternative method is the application of sedative, static discharge by means of a high frequency electrode held firmly against the cheek by the patient in the same position as the positive galvanic electrode. This must be mild and should be continued for about five minutes on each side of the face. As treatment progresses we are often able to use a slow, moderately strong Morton wave for ten minutes. The same method may be used in the treatment of other neuralgias; care is always exercised to prevent any sudden onset of pain by careless or injudicious manipulation of the agencies.

Neuritis, to differentiate from neuralgia, is a distinct clinical entity, and is localized either in a single nerve or it involves a number of nerves, as for example in multiple neuritis. It is an inflammatory process tending to nerve degeneration, and muscle atrophy. Symptomatically, neuritis is characterized by a sharp, bor-

ing pain felt usually along the course of the nerve itself and its area of distribution, and is increased by pressure. Atypical cases of neuritis may easily be confused with neuralgia. One important diagnostic difference lies in the fact that pressure upon the nerve in neuralgia quite frequently relieves the pain, except in *tic douloureux*, while in true neuritis the pain is augmented by pressure. Neuralgia is a functional disturbance, never associated with atrophy, while neuritis is a pathologic disorder almost always associated with some degree of muscle atrophy.

The electrical reactions in neuralgia are usually normal, or if any abnormality exists, it either quickly disappears or is found to be of neuritic or other origin. But in neuritis we find all degrees of variation of the electrical response. In local neuritis, for instance, we may find a complete reaction of degeneration in a few days after the onset of the disease, or there may be but slight change throughout its course. In multiple neuritis, irritability of muscle and nerve is markedly diminished. There is complete loss of faradic response in most cases, and much greater currents, both of the galvanic and faradic types, are required than in normal conditions. This is one of the pathognomonic signs of true neuritis.

Peripheral facial paralysis, or Bell's palsy, is a neuritis of the seventh cranial nerve, which is amenable to treatment with satisfactory results in most cases. The diagnosis is not difficult,—the attack is often ushered in with a severe pain about the face. It occurs as a result of exposure to cold or from a focus of infection such as tonsillitis, sinusitis, or epidemic sore throat. Other affections of the facial nerve are associated with hemiplegia or involvement of other cranial nerves. Prognosis should be guarded until after the eighth or tenth day, but treatment must be started immediately after the onset of the first symptom.

The amount of pain and the degree of degeneration are the controlling factors in treatment. To make a proper test for the reaction of degeneration, the normal side should be examined first, attention is directed to the character of the response to each stimulation and the

amount of current required. The normal reaction has been stated above. If, in testing the affected side, a sluggish response to faradism is found, slight nerve degeneration has occurred. As a rule in these cases there is no change in galvanic irritability and the usual disability is two or three weeks. In another group we find no response to faradic stimulation but a normal or slightly changed galvanic response, which exists from one to two months. In a third group, there is no response to faradic stimulation, and the muscle irritability is decreased so that the contractions are sluggish, even though the cathode still produces the stronger contraction. Recovery usually takes place in from two to four months. Finally, there is a group in which the faradic irritability is absent, and the galvanic reaction varies from an equality of contraction to the typical reversal of complete degeneration. Recovery is always slow, and varies from three to ten months or even longer.

In treating a case of Bell's palsy, and this applies to other forms of neuritis as well, we make it an infallible rule to begin with applications of heat, usually radiant heat and light. When the pain is severe, diathermy should always be used. Following heat, galvanism is employed from thirty to forty minutes. The positive pole is applied if much pain is present, or the negative pole in the absence of pain for its trophic, stimulating effect. Next, some form of stimulation should be used, such as the interrupted galvanic, faradic coil, or sinusoidal. The type to be used depends upon the degree of degeneration; thus, in the first group, where the nerve still responds, the Bristow coil is employed, and not more than three to five contractions are given to each muscle group. In the second group of cases, the slow sinusoidal current should be used, not to exceed ten minutes. The frequency of contractions to be about twelve per minute, and the amplitude slightly less than peak capacity for that muscle. This is important in order to prevent fatigue.

The remaining groups are treated in much the same fashion, using either interrupted galvanic or slow sinusoidal. In using galvanism for stimulation the pole which gives the best contraction should always be used; that is, in cases

of marked degeneration, use the positive pole, and in all others use the negative. Tests for the reaction of degeneration should be made at intervals, usually every fourth or fifth treatment, to determine the progress and to indicate any change in treatment.

Sciatica usually is diagnosed as either a neuralgia or a neuritis, depending on the severity of symptoms, but it is in reality a neuritis. Osler describes it as an "interstitial inflammation of the sciatic nerve, causing severe pain in the branches of distribution and, if long continued, atrophy of the muscles." It is practically always secondary to some adjacent condition such as sacro-iliac strain, arthritis of the lumbosacral region, pelvic disorders, constipation, or focal infection of any sort. One of the important diagnostic features is the fact that there is definite pain on pressure in the gluteal region, while little pain is felt along the course of the nerve. There are points of tenderness at the sciatic notch and in the center of the thigh which are painful on pressure, and the patient often walks with the knees slightly flexed in order to take the tension off the nerve. Since sciatica is an inflammatory process, treatment should be directed toward the relief of the pathologic changes present. One factor which should be considered is the anatomic relation of the nerve to other structures in the sciatic notch. The nerve passes between the piriformis and superior gemellus muscles, and when it is swollen it is probably pressed upon by these muscles. May not these muscles then, due to their inherent irritability, become spastic as a result of extension of inflammation and thus increase the pressure upon the nerve? Believing this to be true, the first step in our treatment is the application of deep, penetrant heat to this area by means of diathermy. A small electrode is applied over the sciatic notch, and one slightly larger either directly over it on the anterior surface of the thigh, or on the anterolateral surface of the thigh just below the greater trochanter. In this way, we obtain a maximum of heat in the region of the notch and some heat along the course of the nerve immediately after its emergence into the leg. In severe cases the direct, through and through method is preferable, and it is always best to precede the application of

diathermy by radiant heat and light. We frequently follow this with an application of positive galvanism to the region of the notch for twenty to forty minutes. All cases of sciatica will not respond to physical therapy, but many will improve under the proper prescription and galvanism should seldom be excluded. Prognosis usually depends upon the etiological factors.

Lumbago is the term usually applied by the laity to any painful affection of the back. True lumbago is an inflammatory process, involving usually the white fibrous connective tissue (Osler), and extending between the muscle fibres. Careful study to determine the etiological factors is of prime importance in both diagnosis and treatment, for, if caused by a neuritis of the posterior nerve roots, the treatment of neuritis should prevail. Or, if due to postural defects, their correction should be followed by relief of symptoms. In general, treatment consists of application of radiant heat and light followed by positive galvanism. It is advisable to employ short, mild applications of the rapid alternating sinusoidal current to relieve the spasticity of the muscles involved.

Other forms of myalgia, such as torticollis, respond equally well to the application of radiant heat and light and positive galvanism. In using these currents it is important not to use the rapid sinusoidal more than three to five minutes preceding the slow sinusoidal wave, and this should not be continued over ten minutes in order to avoid tiring the muscle.

#### SUMMARY

Modern scientific medicine demands physical measures for the treatment of peripheral neuromuscular affections, and the end-results of such treatment depend upon one's knowledge of the physiologic processes of the parts involved, as well as knowledge of the uses and limitations of the agencies at one's command.

Diagnosis in these cases depends upon the area and character of pain distribution, and upon the reaction of degeneration which should always be obtained.

Prognosis in functional disturbances of either muscle or nerve depends usually upon the etiological

factors and their treatment. In inflammatory lesions, the prognosis depends solely upon the reaction of degeneration.

Treatment should be started early and should be based on the kind and degree of pathologic change present. Care must be exercised to avoid over-treatment, particularly with reference to galvanic and faradic stimulation. The amount of current which produces the greatest contraction should never be used, but rather an amount which barely elicits a contraction. If faradic irritability is absent the use of the Bristow coil is not advisable. Faradic currents indicate nerve irritability while galvanic currents indicate muscle irritability. As a rule, treatment should not be given oftener than every second day. In peripheral paralyses the reaction of degeneration should be determined every week or ten days, and changes in treatment made as indicated.

Because of their flexibility, the low volt currents are of inestimable value in this group of conditions, since they are essential for diagnosis, treatment and prognosis. While it is true that many cases of neuritis, such as Bell's palsy, will eventually recover without treatment, the margin of safety is increased by the intelligent use of the faradic and galvanic currents and their modifications.

#### DISCUSSION

S. WOLDENBERG, M. D., Chicago: I want to voice my appreciation for the clear presentation of this timely subject. If my views are somewhat different from that of the essayist I can only plead that they are based on personal observation and experience. I do not believe that one can actually differentiate neuralgia from neuritis by the effect of pressure over the nerve. The terms are somewhat synonymous; and while it is true that symptomatically they differ widely, the conditions overlap and are frequently misinterpreted.

Sciatica may sometimes be a secondary condition and the treatment depends on the causative agents. Physical Therapy will not correct the primary cause and the effect of the treatment is transient. Indeed, I have never been able to give permanent relief with physical agents. Orthopedic measures are highly useful. Stretching of the nerve and the relief of spasticity follows proper orthopedic mobilization. The tendency is to sometimes overlap a measure due to one's enthusiasm.



I am surprised to have heard that lumbago is due to posture. That has not been my experience and is not the accepted idea today. I am sure that the essayist might have been more specific if he had had more time to go into the detail of the causative factors. However, the impression gained by impatient and critical listeners is that we have numerous panaceas. This is due to the fact that we are prone to stress the values and to omit the failures or limitations of our various agencies. The greatest enthusiast and the severest critic are the ones who do not understand the science in back of it, plus the unfounded hostility due to ignorance. I appreciate the many good suggestions of the author.

DR. J. W. TORBETT (Martin, Texas): I appreciate the article Dr. Libbert gave because of his practical ideas and his caution not to overlook treating the causes. I think that is a very important thing in all physical therapy, to always find out what the reaction of the patient is to the treatment he received. In fact, I think it is a good idea not to have too much introspection, but if you have a patient who is taking treatments, don't give him too many kinds of treatments at one time; alternate, give galvanism one day and light the next.

A careful description of the reaction of the patient after the treatment is necessary where there are so many different degrees. Precaution must be used in treating where the condition of the nerve is swollen and inflamed. It will relieve them because it has a superficial stimulating effect on the skin; it relieves the congestion like a plaster would; diathermy drives the heat on through to the nerve. He cautioned us about its use.

In many cases of sciatica I have found mild doses of the x-ray to be a very splendid supplementary treatment, given about every four days, and watching the effect by the reaction. We don't know how the x-ray works exactly but it has the power of absorption in the fine tissues, especially in those chronic cases where there are symptoms of fibrosis. Negative galvanism in those cases is more beneficial than the positive because of the power to increase the circulation and absorb fibrous tissue that may be producing the pressure.

Of course, in all of my cases I prescribe hot baths and rest in bed, after the bath is over. To sit in hot water at bed time is beneficial and a fine thing to produce sleep. In water the muscles are relaxed and the stretching can be well done.

The doctor's paper was a very practical contribution. He cautioned about the diagnosis and showed how to differentiate neuritis. It doesn't make so much difference if you find the cause. In many cases it is definite and in other cases unknown.

DR. GEORGE B. LAKE (Chicago): I just want to say one word or two about tic douloureux. This is probably one of the most excruciating pains to which the human body is subject, and the disability which results in a patient with this disease is not solely due

to an attack of pain but to the overpowering dread that an attack may come. This is present all the time in an individual who is subject to this condition.

We should always remember that there are cases of tic douloureux which are not amenable to any ordinary treatment. When we start our treatments or anything else we should always have the mental reservation that if we do not seem to be getting any results within a reasonable time the patient should be referred to a neural surgeon. I think the modern idea is the cutting of the posterior sensory root before it enters the ganglion, an operation which is preferable to either injection of or section of the afferent root.

So let's remember when we start treating tic douloureux not to carry that patient along for too great a length of time with the idea that we are going to get some results. If you don't get some results rather promptly, immediately begin looking around for a thoroughly competent neurosurgeon to whom you can simply leave the patient for section of the posterior afferent sensory root.

DR. E. N. KIME (Indianapolis): I wish to commend Dr. Libbert for the thoroughness with which he has reviewed this subjects and the attempt to cover in a few minutes a very wide territory.

Naturally, we must always be conservative in handling of cases of neuritis, neuralgia and these other painful affections of the peripheral neuromuscular mechanism for the very reasons that have been pointed out by Dr. Woldenberg and Dr. Torbett. Indeed, many of these cases in which we fail do prove to have a neoplastic basis. Cases of spondylitis, for example, which do not yield to properly administered therapy, have been shown by autopsy at hospitals to be malignant diseases of the spine.

Dr. Woldenberg brought up a point that he had never seen a case of sciatica permanently cured by physical measures. I do not agree with that statement. I agree heartily with the ultimate conservatism which he has injected into this discussion, but I have seen cases of chronic conditions of the sciatic distribution in which rest, posture and these various orthopedic forms of therapy had been utilized in which the patients were completely relieved and stayed relieved after properly instituted physical therapy.

I particularly wish to recommend to you the method of diathermy in properly selected cases by way of the rectum and of the small electrode over the notch. I have seen that give brilliant results in a few cases.

Naturally, we must be very careful about the promises we make to the patient when the diagnosis is not completely clear, but we should not hesitate to proceed along the lines of that form of therapy which will give us symptomatic results and work out our diagnosis as we proceed, because we know many times that the diagnosis cannot be made until long after the patient is apparently well. (Applause).

DR. EDWIN L. LIBBERT (Lawrenceburg, Indiana): I am indebted to all of these discussants for their help. I appreciate Dr. Woldenberg's discussion but I can't agree with his statement that there are cases of primary sciatica. I think the fault lies within ourselves in the fact that we are not able in many cases to find the cause, but I believe there is one some place.

I readily admit that it is not possible in many cases to differentiate between neuritis and neuralgia. I do not wish to leave that impression, but I do believe that if you have a painful condition of an arm, for instance, or a leg, on which pressure on the nerve, the chief nerve of distribution, causes pain, it is a neuritis and is not a neuralgia. As I stated in the paper, if neuritis is associated with neuralgia, then it is also impossible to differentiate between the two.

Dr. Torbett's suggestion of alternating treatment is very good, but we must remember it was pointed out last year by Dr. Giesy that we must have prevention in physical therapy just as we have in drug therapy, and for that reason we cannot give one agency today

and another tomorrow and another the third day. We must have a definite foundation, a definite prevention basis upon which to work and judge our results accordingly.

I am unfamiliar with the use of x-ray in the treatment of these conditions.

Dr. Lake made a very timely suggestion not to "kid" people with *tic douloureux* into the idea that you can either cure them or help them in some instances. Many of these cannot be benefitted at all with physical therapy any more than with alcohol injections. I remember one patient who had two alcohol injections with no relief whatsoever. With our procedure with physical therapy it was quite dramatic: perfectly cured, but in the second day she came back just as bad as she was the first day.

I agree with Dr. Kime in that we do have cases of sciatica which are apparently permanently cured; that is, over a period of two or three years there is no return of their sciatica.

## COLONIC THERAPY\*

CARLTON L. ROWELL, M. D.

CHICAGO

Colonic therapy, in one form or another, has been practiced almost from the beginning of time. When the layman takes a cathartic pill he is applying therapy to the colon. When the nurse in the hospital gives an enema she is practicing colonic therapy. Aside from the enormous quantity of laxative drugs used, there are thousands of the laity taking their daily enema.

One of the first things the physician *always* asks about when taking the history of his patient, is the condition of the bowel. And he usually finds it necessary to start his treatment with a laxative or purge.

These facts indicate that the medical profession recognizes the important part which the colon plays in the production of health or disease. Considering the great importance of the subject it is amazing how little real attention has been given it by members of the profession.

In analyzing the indications for colonic therapy one comes to realize a little more fully

just what the proper functioning of this so-called "cesspool of the body" means to us. The average individual outside the profession, and, strange to say, a great many members of the profession, have an idea that the only indications for treating the bowel are conditions which manifest themselves in the bowel itself—constipation and diarrhea, for instance. As a matter of fact, a majority of the patients who are in need of this treatment have few or no symptoms to the gut itself. They will tell you that they have had one or two evacuations daily for years and are naturally skeptical when told the colon may be the seat of their trouble.

The subject is too great, and the time allotted too short, to take up the indications in detail. I am going to risk giving the impression that I consider colonic therapy a cure-all by saying that all chronic conditions, and quite a few of the acute, such as pneumonia, influenza, typhoid fever and acute heart disease, constitute indications for colonic therapy. Why? For the same reason that, unless there is some spe-

\*Read at the seventh annual meeting, American College of Physical Therapy, Chicago, October 10, 1928.



cial contra-indication, and these are very few, these conditions are indications for a cathartic or an enema. By removing the handicap of intestinal toxemia, the patient's natural resistance is given a better chance to overcome the condition from which he is suffering.

Aside from colonic stasis and the ailments which manifest themselves in the opposite condition—diarrhea—consistently good results can be expected in so-called essential hypertension, infective arthritis, skin diseases and, as I said before, almost any chronic condition that can be named. There are also a number of more or less vague symptoms, such as headache, backache, nervousness, anorexia and insomnia which, in the absence of any direct cause, very often respond to colonic therapy in such a way as to be very gratifying to both patient and physician.

The failure of other measures, such as drug therapy, vaccine therapy, electrotherapy, diet and even surgery is, in my opinion, due in many cases to too great handicap of an infected colon.

The technic of colonic therapy is very simple—to tell. It consists in passing a soft rubber tube, 52 inches in length, into the cecum or ascending colon, where drainage is instituted by means of irrigation, and medication is applied. The passing of the tube is accomplished entirely by manipulation, and mastery of this maneuver comes only with experience. The following description is taken largely from Schellberg's "Mechanics and Chemistry of the Human Body."

A detailed description of the apparatus used is unnecessary, the essential feature being a two-way valve which permits the operator to let water flow into or out of the gut at will. With the patient on his left side, knees drawn up, and the tube attached to the apparatus, enough water is allowed to flow through the tube to force out all air. The tube is clamped about four or five inches from the end with a sponge forceps, the end and exploring finger thoroughly lubricated with white vaseline, and the finger inserted into the rectum to push back folds of mucous membrane and determine the direction of the gut. The tube is now inserted very slowly and gently, the forceps removed and

the flow started. Ordinary tap water is used for this part of the treatment.

After the rectum has been emptied of gas and feces, the tube is advanced to the sigmoid. Allowing only small quantities of water to flow in at a time, the advance of the tube is continued. This is made possible by the column of water, which dilates the bowel ahead of the tube. As long as there is no obstruction and the water flows freely, the tube can be passed safely. The flow is indicated by a glass gadget attached to the apparatus.

Sometimes a tube can be passed as far as the hepatic flexure without reversing the valve; again a very active sigmoid may cause the tube to coil up and prevent its further advance. When this occurs the tube must be withdrawn to the internal sphincter, the valve reversed to empty the gut, and the maneuver repeated. A second trial will usually enable the operator to pass the tube as far as the splenic flexure before the sigmoid coils again. At this point the valve should be reversed and the tube slightly withdrawn. With the water turned on again the tube is now advanced past the flexure, at which point the patient is turned onto his back and the procedure continued until the hepatic flexure has been passed.

Deliberation in the passage of the tube is very important, because quick, jerking motions is likely to make it encounter obstruction. The operator must always bear in mind the anatomical nature of the part of the gut in which he is working. For example, one may encounter in the transverse colon a mass movement shut up as in a chamber, with a sphincter at either end, exactly as is found in the rectum. At times one is fortunate enough to strike the center of this sphincter, opening up a passageway through the middle of the mass; but more often the tip will pass at the outer edge, where advance is impossible. If this occurs, the tube must be withdrawn a little and the water turned on again. If it still fails to flow, the tube is withdrawn until the flow starts. The gut is then dilated at this point with six or eight ounces of water, the tip withdrawn a few inches, the valve being kept open. If this fails to open the

pocket, more water is thrown in, the valve reversed and the tube advanced very slowly. This procedure may have to be gone through several times before there will be a movement of the intestine toward the left, thus relaxing the temporary sphincter. Sometimes it will be found necessary to withdraw the tube below the splenic flexure, thus bringing the sluggish moving intestine to the left and opening the sphincter. The water can then be turned on and the tube passed deliberately and firmly to the cecum.

In some cases when the existence of impacted masses of feces, angulations or loops compels very slow passage of the tube, the greater portion of the gut will be carried into the left abdomen by the colon's physiological attempt to expel the foreign body. This arrests the tube midway in the colon. The irrigation, however, will not be any the less successful on this account. The cecum will now be at the hepatic flexure and from this point it is perfectly possible to irrigate and empty it.

After the cecum has been reached, a quart of solution at 50 degrees Centigrade, containing proper medication, is injected, the tube being slowly withdrawn with the flow so that the solution is spread along the full length of the gut.

The solutions employed during the early, or cleanup, stage of treatment vary with the condition treated. The five most commonly used are (1) heavy alkaline, consisting of one-half ounce of sodium salicylate and one-half pound of granular sodium phosphate; (2) Zonite, containing one ounce of Zonite solution; (3) colloidal silver, containing twenty-two grains of neo-silvol; (4) sodium acid phosphate, one-half ounce; and (5) sodium thiosulphate, one ounce. An emulsion of ichthyol in kerosene and water, and a solution of quinine sulphate are alternated in the treatment of amoebic dysentery.

After the bowel has been thoroughly cleaned out, which usually takes from two to three weeks, in some cases much longer, living cultures of bacillus acidophilus in a solution of milk sugar, are substituted. About this time a gradual reduction in the frequency of treatment

can be made, until the patient is getting one or two irrigations a month.

Electrotherapy can be applied in conjunction with the irrigations. The breaking up of adhesions in the abdominal cavity can be accomplished with a combination of diathermy and the slow galvanic sinusoidal current. Diathermy is applied through the abdomen and the sinusoidal is given by means of two small electrodes applied on either side of the spine, just below the angles of the scapulae, to cover the point of exit from the spinal canal of the nerves which supply the colon. The alternating sinusoidal current can be applied by means of an eight by five electrode on the back and a three by five on the abdomen; the latter being moved from time to time during the treatment to cover the course of the colon. These two modalities are also used in conditions of atony and ptosis, so commonly found in colonic stasis.

Spasticity of the sigmoid, and other localized inflammatory conditions of the lower bowel, can also be treated successfully with diathermy and galvanism, by means of electrodes applied through the sigmoidoscope. This method may also be used by reactivating the upper and lower defecation reflexes, whose function is so often impaired or entirely lost.

The success of the physician, or any practitioner of the healing art, depends upon results. The results of colonic therapy, properly applied, are generally good; in some instances startling. The patient invariably experiences a return of bodily and mental vigor, an increase in endurance, a feeling of general well-being. Along with this there is usually an improvement in the condition for which he seeks relief. Patients with arthritis and skin diseases may notice a change for the better in from three days to three weeks. The function of the colon is reestablished and catharsis can in time be dispensed with.

Case History. Miss S. Age 50. Had been treated for 2½ years for high blood pressure. Urinary findings had been negative. Had lost a great deal of time from her work, in fact had not drawn a full pay check for a year and a half. Came to me July 7, 1927, at which time her blood pressure was 210-100. Examination

of a specimen from the colon showed numerous staphylococci, bacilli coli, considerable *d. welchii*, gram positive diplococci and a few gram positive bacilli. July 13th there were bacilli coli, an occasional streptococcus, considerable bacilli welchii, gram positive diplococci and bacilli and a few staphylococci. On July 14th, after seven treatments, her blood pressure was 146-100, a decrease of 64 points in the systolic pressure. July 20th, after thirteen treatments, the blood pressure was 140-88. July 28th she complained of being dizzy all day and her blood pressure was 158-86. July 29th, after six implantations of bacilli acidophilus, a specimen showed a growth of acidophilus, bacilli coli, numerous bacilli welchii, and gram positive diplococci. On this date she returned to her home in Iowa. From time to time she reported that she was having no recurrence of her trouble and was feeling better than she had for years. Returned August 3rd of this year with a blood pressure of 180-80, but with no return of symptoms. Six treatments reduced the pressure to 148-82, and after nine treatments she again returned to her home.

**Case History.** Mr. Y. Age 62. Infective arthritis involving entire spine, with marked ankylosis. Had not had a normal evacuation for 30 years. Coated tongue and bad breath. Specimen showed very numerous bacilli welchii, numerous bacilli coli, gram positive diplococci and bacilli. On the nineteenth treatment a streptococcus was found. Implantation of bacilli acidophilus was not started until the thirtieth treatment and after eight plants there was a good growth of acidophilus with a marked reduction in the number of bacilli coli and bacilli welchii. After fifty-five treatments his bowel is moving regularly without the aid of drugs, and he feels better than he has for many years. Plays golf two or three times a week. Pain in back, coated tongue and bad breath have cleared up.

**Case History.** Mrs. M. Age 31. Multiple infective arthritis. One and one-half years duration. Gradually becoming worse. Distress in right lower quadrant for past five or six years. One evacuation daily until two months ago. Now has to take cathartics. Frequent examina-

tions of the bowel content were made but it was not until the thirtieth treatment that a streptococcus viridans was isolated. At the following treatment a hemolytic streptococcus was found. These were added to her vaccine, which she had been getting for six months from the physician who referred her to me, but she was forced to return to her home in Michigan with no apparent improvement in her arthritic condition. Except for the fact that her bowel action is improved she is no better. She had a total of thirty-five treatments.

**Case History.** Mr. J. Age 35. Present illness started January 11, of this year, with diarrhea, which lasted two days. Since then has had to take cathartics. Is extremely nervous, complaining a great deal of his eyes. Has recently had glasses fitted, but with little or no relief. Has not worked for past month. Has spells of vertigo, relieved by lying down. Lies awake for two or three hours after going to bed. Appetite good. Had a thorough examination at a clinic January 17th, including spinal puncture. Was told that, aside from some infected teeth, which should be extracted, there was nothing wrong. His dentist refused to pull more than two of his teeth, telling him they were not responsible for his symptoms, and sent him to me. Examination of his abdomen disclosed a marked colonic stasis, which was confirmed by the x-ray. Treatment was started February 7th and three weeks later he returned to his work. He had only thirty irrigations, a second x-ray being taken after twenty-six treatments. He has been working regularly and is having no trouble with his bowel action.

**Case History.** Miss H. Age 47. Syphilis for past six years, during which time she has had over seventy injections of salvarsan and neo-salvarsan. Seven or eight Wasserman tests, all 4 plus except one 3 plus three years ago. Three years ago had dysentery for six months, with hemorrhages from the bowel. Had two rectal abscesses, also multiple ulcers as far as could be seen through the sigmoidoscope. About two weeks ago went to Schellberg with chest and abdomen completely covered with iodide rash. This cleared up in the five treatments she had there. Her general improvement was amazing.



She resumed treatment with me and after four treatments a Wasserman, made out of curiosity, was negative. Kahn test, however, was positive. She improved rapidly and after fourteen irrigations, anti-syphilitic treatment was instituted.

In conclusion I want to say a word about O Boto Schellberg, of New York, the man who originated the technic described, and who has spent over thirty years in an intensive study of the colon. His ideas and those of Crile, Kendall, Alvarez, Cannon, Hurst and other contributors of valuable information about the human body, are in close alignment. Their writings corroborate his observations and bear him out in his contentions. I believe Schellberg should be classified as a man of vision, a practical scientist, and very observing rather than learned. This is clearly demonstrated in his knowledge of the mechanics of the human body, which I have had an opportunity to confirm in my practice. His work has opened up a new field in medical science so vast that it calls for a much more thorough investigation than has ever been accorded it.

#### DISCUSSION

DR. L. A. TARBELL (Battle Creek, Mich.): There is no question that colonic therapy is a very old measure of treatment. I have enjoyed very much hearing this paper and the results which it has accomplished.

The success of any method or technic varies with the ability of the operator to master that technic. In our case we have tried the high colon therapy and have not met with special success. I have only tried it personally a few times. I met with difficulty a few times, and on one occasion I was quite delighted and thought that surely I had the tube in the secum because it had gone the full length, but when I checked up with the x-ray I was surprised to find that it was doubled up, and that it just reached into the transverse colon.

The speaker mentioned once that there was too much attention paid to colonic hygiene. Previous papers which have been prepared, especially those in which hypertension and arthritis were mentioned, show that a great deal depends upon colon extension and a great deal on medical affairs.

I think it would be folly simply to try to administer colon hygiene to a great many patients without trying to do something to correct the cause for this particular condition. With many of these patients it is due to diet alone.

No matter who the patients are, if they do not eat properly, if they do not take sufficient bulk, if they eat concentrated foods, they do not have proper habits and consequently it is hard to get proper evacuation.

I think colonic therapy should be used in conjunction with all of the other measures at hand, and like most of our physical therapy, should be used as an adjunct to other means.

Personally, it seems to me that we can accomplish the same results by much easier methods, both for us and for the patient.

As I said before, the success of any technic depends a great deal upon the operator and eventually the results of any method must be measured by the success which it accomplishes.

DR. FALLS (Indianapolis): In this class of cases I am sure that we should make a general examination as a routine. These cases, I think, should always have an x-ray study of the gastro-intestinal tract. We should take the written history in great detail and the cases should be correlated very carefully. Such undermining diseases as tuberculosis and syphilis should be ruled out beyond a reasonable doubt. There are associated conditions and complications, etc., in most of the cases that should be taken into consideration in our treatment; in fact, we should institute all the treatments we reasonably can to build up these cases in a general way, and as a rule we can accomplish a great deal.

My work has been largely gastro-intestinal for twenty-three years and I am very much interested in what the doctor had to say in regard to special methods of treating the colon. I doubt that I could carry it out so successfully. Some years ago I had a case of traumatic colon but I didn't treat it as the doctor suggested.

There are two questions I should like to ask the essayist. I should like to ask if he ever finds a rather large percentage of cases or a considerable percentage of cases in which there is spasticity, especially on the left, which may be made worse by the introduction of water; that is, the spasticity itself increases with the introduction of water.

The other question is whether he thinks a soda bicarbonate solution, say about two per cent of warm solution, better than the tap water that he suggests injecting into the bowel. I have been impressed by the fact that tap water is somewhat irritating to the mucus membrane of the intestinal tract. We notice if we get plain water in our eyes it is more or less irritating to the conjunctiva, and I should like to ask if there is objection to using the sodium bicarbonate solution instead of plain water.

DR. LAWRENCE (Westerville, Ohio): I am very pleased by what the last speaker has said because I have been anxious to say very much the same thing.



Sometimes in searching for some new method or system we overlook the simplest and most obvious thing. My method hasn't been mentioned yet today and I think it ought to be. I don't believe that it is the best physiology to reverse nature. When you start to put your fluid in at the wrong end it may clean out the colon, but in my practice, which is just the ordinary everyday general practice, the thing I do when I find about 75 per cent of my patients have colon stasis and are drinking about a glass or two of water a day is to make them drink eight glasses of water or more a day. That is so simple a thing that anybody ought to do it, but it is the obvious thing that is so often overlooked. To the essayist all I have to say is "Get back to nature and fill them full of water by nature's methods."

DR. PAUL ROTH (Battle Creek, Mich.): We should not as physicians ever admit the fact that constipation should ever be considered normal for man. We should fight it. We have plenty of evidence to know that the general trend of living processes of the body is downward with our present generation. It is decidedly more downward in women than it is man, and I believe it is so because of the fact that women are more universally constipated than men.

I have had a splendid opportunity at Battle Creek to study a large number of clean young women—women whose condition is as nice as you could expect to find anywhere, and I have been appalled to find that 48 per cent of those students have a metabolic rate below the normal minimum limits. That is significant. I have not as yet very good statistics with regard to man, but I am sure that it is not nearly as low as that.

Constipation induces toxemia, but by any such term as it is known it is one of the universal causes of general deterioration (mentally and physically) of humanity. It has been so stated by a speaker a short time ago right here.

Physicians have known for centuries that when a man is laid up he depreciates mentally and physically. We are doing the same thing that has been done for many centuries past. I have verified it in a few cases, unfortunately just a few cases. I have picked out individuals who were toxic as indicated not only by their statement that they were constipated, but by actual determination of their chemistry and urinary findings. They were put on a very simple diet which combatted the constipation. In every one of the cases studied, except one, the metabolic rate was below the normal limits, and it came up spontaneously within two or three or four weeks.

Much work remains to be done in this respect, but I believe that by means of the study of the metabolic rate we are going to show some rather remarkable things with regard to the tendency of the race toward lowered vital activity and how it can be remedied.

DR. CARPENTER (Chicago): I can't let this go by without challenging the essayist's method of treating the colon by the x-ray, and its emptying.

I feel when a colon is filled by an enema and is overdistended you have no right to say that it lacks propulsion afterward. A colon to be judged properly should be filled by a barium meal, not by an enema. Then you have nature's way of its passing through that bowel, and if you are willing to devote sufficient time to it to make the examination often enough to judge, you can get a far better idea of the normal action of that bowel with the x-ray and the barium meal rather than by rectum. I feel that when we give treatments by rectum that it is a lazy method; a sloppy way of getting the proposition over with. It doesn't do it in nature's way.

DR. BARNHART (Dayton): I have been working with colonic therapy for twenty-five years and have been interested in it all the time.

During that time I have taken hundreds of x-ray pictures and treated these cases, most of them referred cases from physicians, mostly post-operative cases or chronic conditions, and I want to bear out the truth of the last speaker's remarks on his summing up colitis. At the same time I should like to take exception to one or two of his statements in dealing with colitis.

For instance, irrigating it from above, downward, the treatment of colitis by the Schellberg method is unquestionably the best method to use. We remove existing exudates and inner lining adhesions in a manner which cannot be improved on in any other way except by passing a tube and getting it as high as possible. You can't always pass it to the cecum because you frequently find many loops and spastic conditions, that it is impossible to pass it. I have passed a tube many, many times to the cecum and irrigated the bowel where other treatments had failed.

We get results with colonic irrigation in a majority of cases that are most surprising to the patients, relieving them of their troubles, no matter whether we absolutely cure the colitis or the conditions that exist in the mucous membrane.

Referring back to the talk on arthritis, I have examined hundreds of cases, and there wasn't a single one that did not have its origin in the bowel organs as could be observed from direct inspection at that point. I have examined these and have watched their progress for many years. All other treatments will fail in the majority of cases but colonic irrigation showed favorable results.

I was going to make one point about the Schellberg method. It seems to me that there isn't any treatment or any therapy that is as much misunderstood and neglected as colonic therapy. Physicians will refer cases to various physical therapists for treatment and neglect to include the colon or an examination of

the colon. I believe the examination of the colon by barium *enemas* is the best method to obtain the idea of functioning of the large bowel rather than by the barium *meal*, because in giving the barium enema you have an opportunity to examine it directly for adhesions and other abnormal functions that you will observe through the fluoroscope. That should be done with the fluoroscope and not merely judged from the x-ray picture. The only way I would treat a case would be to have it examined externally by the fluoroscope, and that is the only way that we can get good results.

The Schellberg method, by allowing water to flow in there, flowing upward, is not contrary to nature. It is absolutely in conformity with the natural function of the bowel, because you are emptying the rectum first, which is nature's way of emptying the large bowel, and at the same time you are also breaking down the fungus growth and the inner lining adhesions, giving the bowel a thorough cleaning as well as strengthening it and getting rid of the toxic effect.

DR. CARLTON L. ROWELL (Chicago): They say that when Roentgen first suggested that the human organs could be photographed he got a laugh that went around the world.

I think we had better take up these questions that have been asked by the doctor from Indiana. He asked about sodium bicarbonate. It has been shown that sodium bicarbonate favors the growth of bacillus coli. As to whether the tap water is irritating or not, I have never seen evidence, if that is so. Of course, our Chicago water with its large amount of chlorine may be irritating, but I have never seen any evidence to that effect. As to the spasticity of the sigmoid, we have found that that is the hardest point of the bowel to go through. It is the only part of the bowel that blocked us in those few cases when we could not get through to the cecum. It was not aggravated or irritated by colonic irrigation, rather the reverse was the case. In practically every instance in which I have difficulty in getting through the sigmoid during the first few treatments, I can get through later on, which indicates that the irritation is relieved mainly by the hot solutions which I use as a final step in the canal irrigation.

There are two types in which we don't advocate the use of the solution of 50 degrees c., high blood pressure and heart cases. I heard of patients who lost consciousness when such treatments were given. I never had such cases. I never use hot solutions in those patients.

I believe it was Dr. Tarbell who spoke about the coils. I have had the whole tube coiled up in the rectum and still obtained a flow of water in and out, and have reached even as far as the transverse colon; and when you gain that knowledge you know you are getting to the seat of the trouble. Frequently you treat these cases by a sense acquired after long experience.

I am sorry that I haven't had Dr. Schellberg's thirty-five years' experience with all of his knowledge of physiology of the bowel and its bacteriology. He had associated with him some of the best chemists in

this country, and some of the best bacteriologists. He has devoted the last thirty-five years of his life to this one thing and he should know something about it.

So far as going contrary to nature in passing the tube with the way valve, there is no very large amount of water injected at one time, and I believe it offers the best means of passing the tube for irrigating purposes.

When the feces are in such quantities that you can't get the tube through anyway, you have to stay in that spot long enough to get the material out of the way.

In the general run of cases we use the water to dilate, passing the tube as far as possible, and we get into the cecum in a great many more cases than some of our speakers have admitted.

So far as the comparative values of enemas and the Schellberg method is concerned, you only have to practice the Schellberg method or watch it practiced by someone who knows how to do it to realize that there is no comparison whatever.

With a short tube in the rectum running a large amount of water in the bowel there may result distension with gas and feces, and you carry all that fecal material through the sigmoid and lower bowel and over in the right side and pack it in there. Anybody who knows the physiology of the bowel and the natural way it expels its contents knows that that is contrary to nature. Possibly passing a tube may be, but we get results that way.

I have had the opportunity of getting patients from all over the country who have been everywhere for treatment, and I never saw any great improvement in the cleanliness of their bowels, except that I found the lower bowel was clear, more spastic and more irritated.

The last speaker evidently is familiar with the method of administering colonic therapy. The discussion has shown generally a lack of knowledge of Schellberg's methods. I doubt very much if any of the speakers who have discussed this method have ever seen Schellberg work or have watched anybody work with this method, or have watched the results following a fair trial and a real course of colonic therapy. It takes time. You can't take a colon that has taken thirty years to get out of order and put it in order in thirty days or thirty minutes. It can't be done. It is a matter of education. In a scientific way you tone up the colon and relax the bowel.

As a further speaker said, the proof is in the results. We get results with colonic therapy. I showed purposely my difficult cases, but let me say that the good results outnumber the poor ones to a far greater extent than was demonstrated in the pictures. We showed you one out of six. We don't get that number of bad results in the general run. The one that showed bad results still has a chance.

The good results are far greater than the poor ones, over 50 per cent, and the best part of this particular type of treatment is that we get results in cases that have resisted every type of treatment known.

## USE OF HEAT AND COLD IN TREATMENT OF PYOGENIC INFECTIONS\*

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Both heat and cold have long been held in high esteem for the treatment of inflammatory processes. If one were to take away all heat producing methods and appliances, it would leave the user of physical therapeutic measures stripped of almost his entire armamentarium. Like other time honored remedies, heat is coming in for a study of the why and how of its effects. A purview of the facts thus far brought out gives one increased confidence in the value of this agent.

A brief review of the pathological physiology of inflammation is a necessary preliminary to an understanding of the rationale of heat therapy.

Cohnheim was one of the earliest to make a study of what happens in an inflamed area. From his description it will be seen that he did not correctly interpret all that he saw. Since his day others have studied the subject, using not only the web of the frog's foot but also the mesentery and other structures. In the normal course of the circulation the flowing cells maintain a central position in the stream, separated from the vessel wall by a thin layer of clear plasma. In an inflamed area the striking features of the change are the marked dilatation of the vessels, the slowing or even complete stoppage of the local circulation, together with the exudation of serum and the migration of leukocytes.

In inflammations due to bacterial invasion, the harmful agent acts directly upon the endothelial cells of the vessel wall, causing them to swell up and project into the lumen of the vessel. This is but one of the factors that retards the blood flow. It was shown by Lister that in an inflamed area the red blood cells become more viscid. Cohnheim and others describe how that during the slowing of the blood

stream, the leukocytes accumulate in great numbers in the peripheral plasmatic stream, and attach themselves to the walls of the vessel. Stagnation becomes so marked that thrombosis of the minute vessels is a very common occurrence in an inflammatory area, due in part to the fact that the injurious bacterial products render the blood more coagulable, and also bring about destructive changes in the endothelial lining of the vessels.

Swelling in an inflamed region comes about chiefly from the transudation of lymph, due to the walls of the vessels becoming more porous, as a result of loosening the cement substance between the cells, and to degenerative changes in the cells of the vessel wall. Various toxins and metabolic poisons accumulate in this fluid surrounding the site of inflammation.

Segale has shown, by carefully controlled experiments, that as the circulation of blood in a part is retarded the local temperature becomes more apparent. Ludwig and Seiss, Bayliss and Burton-Opitz, all affirm that in an inflamed area the venous blood is warmer than the arterial. Segale, working with guinea pigs, found that the temperature in an inflamed leg of the animal was 0. to 1° C. higher than in the normal leg, with the circulation active. When the circulation was interfered with the temperature in the inflamed area was 2—3° C. higher than in the non-inflamed leg. Immediately following the complete stoppage of the circulation, by compression of the aorta or death, the difference in temperature between the inflamed and non-inflamed areas was markedly accentuated. When chloral was administered, to paralyze local cellular activity, this rise in temperature did not occur. The conclusion, therefore, is that the heat in the inflamed tissues has its origin primarily in the local biochemical activity of the cellular elements which participate in the inflammation. This is contrary to the generally

\*Read at the seventh annual meeting, American College of Physical Therapy, Chicago, Oct. 10, 1928.



accepted view that the heat is due entirely to the large influx of blood. Segale's work indicates that the hyperemia of an inflamed area instead of increasing the local temperature, tends rather to equalize the temperature of the part with that of other parts of the body.

The pain accompanying inflammation is due to at least two factors, the most important one being pressure brought to bear on the nerve terminals by the exudate and the infiltration of cellular elements. Toxic irritating products of bacterial and metabolic origin is the other factor.

Coming now to the treatment of infections of bacterial origin, it may be asserted that the prime indication is not the relief of congestion *per se*. The congestion accompanying inflammation is the attempt on the part of the organism to resist the bacterial invasion. When the cause is removed the congestion will disappear of itself. In the words of Adami, "Inflammation is a danger signal," it is not dangerous in itself.

That the relief of congestion is not the first indication in treating inflammations is proven by the success that attended Bier's hyperemic treatment, because Bier's treatment increases rather than reduces hyperemia.

Heat has for ages been widely and successfully used in treating inflammations, but heat does not relieve congestion—on the contrary, it produces hyperemia.

Schaeffer's experimental work has thrown light on the actual local effect of heat treatment in inflammation. He impregnated pieces of thread with chemicals or with liquid cultures of bacteria. These pieces of thread were buried in the tissues on the two sides of rabbits. Heat was applied over one side of the rabbit, the other side was not treated but left as a control. At varying intervals pieces of tissue about the threads were removed and examined histologically. This enabled a comparison to be made. On the side where heat had been applied, there was an intense hyperemia with marked dilatation of the arterioles, profuse exudation of lymph and to a considerable extent disappear-

ance of the leukocytes. On the untreated side these phenomena were less marked, and the leukocytes were massed around the focus of infection. If sufficient time lapsed for suppuration to take place, then the application of heat caused an increase in the fluid constituents of the pus, and an increased tension in the abscess which favored pointing at the site of least resistance. If after allowing some hours for its effect to develop, the piece of thread was then removed and heat applied, it was found that after applying heat, the area of cell infiltration which was present to a marked degree on the untreated side, had almost completely disappeared on the side treated.

Local heat treatment produces, therefore, an intense hyperemia with dilatation of the small vessels, much exudation of lymph and active migration of leukocytes. When heat is applied before the occurrence of suppuration, it causes a prompt clearing up of the cellular infiltration. Heat applied after the occurrence of suppuration, causes an increase in the fluid constituents of the pus, and hastens pointing of the abscess.

In and about the site of an inflamed area, there is as a result of stagnation of circulation and the accumulation of bacterial toxins and tissue metabolic products, a lowering of the alkalinity of the blood. Pemberton, of the University of Pennsylvania, and others, have shown that when the body is subjected to heating applications there is an increased blood flow, an elevated metabolism and increased elimination of acids, with a resultant increase in the blood's alkalinity. Taylor and Barbus, of the Rockefeller Institute, assert that heating the blood by radiant energy increases its alkalinity.

The increased number and the more active movement of leukocytes brought about by the application of heat, leads to an increased phagocytosis. The increased quantity and the more active circulation of the serum brought about by hot applications, brings to bear on the invading microorganisms more opsonins, lysins, and anti-toxins. In the last analysis it is upon these and the phagocytes that the body depends in overcoming infection. Wright stresses the value of



the free flow of serum as being an important factor in increasing the effect of the opsonins.

Pain is relieved by the specific pain relieving effect of heat and indirectly by the lessening of pressure on the nerve terminals.

There is a very wide range of methods available for the use of heat and cold; only a few of the most effective will be mentioned. In the ordinary run of cases which I see in a large industrial plant, the high wattage incandescent electric light bulbs find a larger use than any other method. The clear glass, in preference to the ground glass bulbs are used, with a wattage of 150 to 1500. Details of the method followed can best be set forth by relating the procedure followed in a recent case of streptococcus infection.

A robust man, J. W. S., 35 years old, was working in the carton department of the Kellogg Company plant. The lining of his shoe was broken and made a ridge across the top of one toe. As he had to rise on his toes in moving the heavy bales of paper, this ridge caused a slight abrasion on the skin of the toe. The toe was not sore but soreness was first felt in a line leading up over the dorsum of the foot to the ankle. He continued at his work for another day. The soreness became worse and at the close of the second day he noticed a red streak from the toe half way up to the knee. That night he had several chills, following which his temperature went up to 102° F. When first seen by me there was only a very slight abrasion of the skin at the atrium of the infection, but a bright red streak varying from one to two inches in width, extended from the toe up to within eight inches of the right inguinal region. The inguinal glands on this side were swollen and extremely tender and painful. His temperature was 102° F. and the white cell count 20,000. A 1500 watt and several 250 watt bulbs were suspended over the leg covering the whole field from toes to inguinal region, with a nurse in attendance. These lamps were kept as close to the skin as possible without blistering. For the first 24 hours this radiant light-heat treatment was not interrupted. During the second and third 24 hours it was continued for 18 hours out of the 24, and in the few hours interim a massive 2 per cent saline

solution dressing was applied. There was marked improvement within six hours, first evidenced by disappearance of soreness in the inguinal glands. Then the upper reaches of the red streak began to fade. The evening temperature was down to 99° F. at the end of twelve hours. The temperature was normal after thirty-six hours. An indurated band an inch in width along the course of the lymphatics extending from the ankle to the mesial aspect of the knee persisted for six days. The radiant light heat treatment was kept up ten to twelve hours a day, but with less intensity than at the outset of treatment. No medication or serum of any kind was used. A heavy intake of fluids was kept up.

My preference is for the clear glass incandescent lamps, but at times we use the hot air bath, the hot water bath, and the whirlpool bath. In all of these pyogenic infections the treatments must be of long duration. Even in treating the small infection starting in a hair follicle, at least thirty minutes should be used.

In pyogenic infections where there is an opening in the skin, either from the original injury or from incision, the efficacy of the treatment can be increased by short intense applications of cold alternating with the hot applications. The part is heated to an intense heat as can be borne, then remove the heat and plunge the member, if a hand or foot, into a basin of water in which there are chunks of ice; or a smooth piece of ice may be rubbed over the part for two or three seconds, then re-apply the heat. This alternating cold treatment can be used with either the radiant light heat lamps, the whirlpool bath or the hot immersion bath. The cold momentarily contracts the vessels, both by its direct action and by the reflex effect. The cold also increases the tolerance of the affected area for heat. With the radiant light heat lamps, an electric fan may be used as a cooling appliance, after the method suggested by Kellogg.

Needless to say, in any case where pus is present it should be evacuated at once and the heat treatment continued.

## DISCUSSION

Dr. F. H. EWERHARDT (St. Louis, Mo.): The question of applying heat in pyogenic infection is so self evident that most of us do it without giving much thought to why we do it. Certainly there is no other method that quite takes its place.

I have heard the name Pemberton mentioned several times today. The essayist mentioned it, and I heard it in the other section several times. I read Pemberton's paper on heat, which came out last winter, and I think it is a classic. Anyone who has an interest in the matter of heat treatment of disease should read that article. It is a splendid article.

I wish that the Doctor had gone a little bit more into the physiology of what happens when he applies cold. The paper was the alternate use of hot and cold, and I think the paper sort of neglected that. We long ago abandoned the idea of bathing a foot in just hot water. It used to be just a hot foot bath that we gave our patients. We do not do that any more. We give a contrast. Our general prescription for any infection of the foot or the hand, when it is to be taken at home, is to place the hand in hot water for four minutes and in cold water for a half minute, and repeat that five times.

The difference between one and the other, immersing the hand just in hot, or, on the other hand, in hot and cold, is the difference between an atonic reaction and a tonic reaction. When we bathe the foot in hot water, by and by we get a paralysis of the vasomotor constrictors and we have a passive hyperemia which approaches, as time goes on, to a venestasis. Contrast that with a condition where the vasomotors are active, due to the cold stimulation, which results in a contraction and relaxation of the blood vessels, which means that the blood is pumped from the seat of the injury, pumped out and in, if you will, but the point is that you will have, for a greater length of

time, a continuously freshly oxygenated blood as contrasted to the venestasis which gives you more or less of a venous situation. I think therein lies the difficulty, that the tissues remain more tonic, more healthy, more vigorous, as contracted with the atonic reaction, which is a sort of flabby reaction.

I am heartily in accord with what the speaker has said. Although I must say that we have not done it very much in open infections, but wherever the skin is not broken, we certainly always do it. I wonder whether it would not be a good idea to use the contrast in our open infections.

Dr. THOMAS F. MEYER (Chicago, Ill.): It is my practice in getting these cases early to recommend cold. The purpose of cold is to inhibit bacterial action. The change of temperature suddenly will rouse up the circulation and at the same time inhibit bacterial action. The later treatment, should it continue, is heat, for the purpose that if there should be bacteria walled off, it will bring about an early abscess formation favorable to incision and drainage.

CHAIRMAN WADDINGTON: Dr. Selmon, in his paper, emphasized that when you are applying heat for infections you do not apply it for ten minutes or a half hour, as some of us have been doing more or less in our offices, but for hours and days. Some of us give only a sample treatment for a half hour or an hour with a so-called deep therapy lamp in the office. That is only a sample treatment.

I believe possibly that we are apt to get a vasoconstriction there by too much of a sedation of the circulatory stream by applying our heat for a great length of time. Where we cannot use ice and do not wish to use those measures, it is advisable to tell the patient to apply the lamp for an hour at a comfortable distance and then intermit, take it off for a half hour and go back again for a half hour. In that way we get the alternative sedation and stimulation.

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# PHYSICAL THERAPY CLINICS

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## MERCURY VAPOR QUARTZ LIGHT THERAPY IN PEDIATRICS\*

H. HARRIS PERLMAN, M. D., P. D.

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PHILADELPHIA, PA.

The subject for consideration this morning is ultraviolet therapy. Artificial heliotherapy is produced by one or more mechanical contrivances found upon the market, in contrast to that form of radiant energy derived from the sun, i. e., natural heliotherapy. Actinotherapy, mercury vapor quartz light and quartz light treatment are also expressions commonly employed as synonyms for ultraviolet therapeutics. Chemotherapy, mercury vapor quartz light and quartz light treatment are also expressions commonly employed as synonyms for ultraviolet therapeutics. Chemotherapy, while less frequently heard, denotes the characteristic chemical properties of ultraviolet irradiations.

Doubtless many of you have been disillusioned from hearsay or by a perusal of current literature and advertising propaganda as to the true nature of this modern form of treatment. Naturally the question arises, is ultraviolet another fantastic contrivance of fleeting interest conceived and lauded by a few therapeutic enthusiasts? Is it really a worthwhile physical means of therapy that commends itself to the profession purely upon merit? Does it deserve a permanent place among other useful procedures in medical practice? This morning I will endeavor, in the short period of one hour, to bring before you a number of children who have been benefitted by ultraviolet irradiations, leaving to you as a tribunal of final decision, the appraisal of its value.

Do not for one moment be misled into believing that ultraviolet is a panacea and fills

that gap in the practice when all known standard measures fail to bring about a so-called "cure." If ultraviolet therapy is looked upon as Aladdin's lamp—the remedy par excellence of last resort used to restore a patient with a fatal disease into health as by the touch of a magic wand, then disappointment will most certainly follow. Mercury vapor quartz light is worthless in checking malignancy, in the treatment of pernicious anemia, or in far advanced pulmonary disease. Attempts to evaluate ultraviolet therapy upon individuals who are the subjects of fatal and chronic disease, in the hope that miracles may happen, is to rob those patients of every possible chance of recovery when there are often better and more generally recognized methods of aiding the body in its fight against disease. Yet ineffective legislation exists and charlatans are permitted to treat patients, often at the expense of the individual's health.

Last year in Philadelphia alone, with a population of more than two and a half million, more lamps for generating ultraviolet and infrared rays were sold than would be thought possible. In another first class city and also a leading medical center of the country, a well known commercial concern boasts of having sold over two million ultraviolet lamps to the public in less than one year, a stupendous number of sales but with what untold harm! It may be safely stated that in the vast majority of instances these purchases were made without the advice of physicians and that the purchaser had not the slightest idea of the harmful influence of ultraviolet therapy, nor a correct knowledge of technic other than that derived from a small pamphlet accompanying the outfit.

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\*Read at the seventh annual meeting, American College of Physical Therapy, Chicago, Oct. 10, 1928.

It seems beyond reason to convince oneself of this indifference which apparently exists among men who enact legislation for the welfare of humanity. At present the only requirement for a prospective purchaser of an ultraviolet mechanism is an electric socket at home and a good sized pocket book. This pernicious practice should certainly be curtailed by laws prohibiting the purchase and use of lights of one kind or another unless they are under strict supervision of medical attendants or trained assistants. In this manner will incalculable harm and untold disaster be prevented.

Like many newly discovered agents brought before the profession, light therapeutics, particularly that form of light energy designated as ultraviolet, has had its trials and tribulations and most certainly many disappointments. In the present light of our knowledge this is not unusual since there is no one drug no matter how valuable, which fulfills the utopian ideals of the therapist. There is therapeutic failure from the use of atropine in some patients; some individuals with positive Wassermann reactions fail to benefit one iota by the timely and routine administration of the newer arsenic compounds. In other words, practitioners have as yet not reached that degree of therapeutic nicety and exactness, when remedial agents can be depended upon to work wonders as by rule of thumb. There are many so-called specifics and others that remain to be discovered. Until that time is reached when drug therapeutics approaches specificity, all measures that are useful and of reputed value in treating physical disorders deserve consideration and therefore a place in the practitioners' armamentarium.

The uses of ultraviolet may, at the present time, be divided into those that are specific in nature and those physical ailments where the light serves the purpose as an adjuvant, i. e., for tonic effect. Rickets, spasmophilia and tetany are examples of the first order. Under carefully regulated exposers the blood calcium and phosphorus become restored to a normal level which spells a restoration of the patient's health. Secondary anemias, malnutrition and various skin affections are materially benefited by light therapy. While it is too early as yet

to determine the exact manner in which improvement is brought about, clinical recovery does occur. Probably results are produced by indirect action of the rays, inasmuch as it is well known that irradiations penetrate the skin surface but slightly. In this respect it might be well to mention that the sterols, particularly cholesterol of the skin, may serve in the nature of a catalyzer, for it has been shown that there is an unusually great affinity for combining power of ultraviolet with those bodies known as sterols. Without entering into the physics of light therapeutics, a few facts relative to the properties of ultraviolet may not seem out of place.

Ultraviolet light is that form of energy composed of long, middle and short rays. It occurs naturally in the sun and may also be produced artificially. In position as to wave length, it is found between the visible violet rays and invisible but powerful roentgen rays. Natural sunlight under optimum climatic conditions contains about 7 per cent of ultraviolet whereas artificial heliotherapeutic contrivances produce as much as 28 per cent. Devices for producing ultraviolet commercially may be used at the physician's will, i. e., during inclement weather. The artificial production of ultraviolet is constant, whereas ultraviolet from natural sunlight varies according to season and altitude. Atmospheric gases also interfere with the passage of natural ultraviolet. The short rays of natural sunlight are filtered out by any dust laden atmosphere.

Artificial heliotherapy may be produced by heating any fusible metal to incandescence. Mercury is the element of choice because it produces a large percentage of ultraviolet. Quartz burners are of two varieties, the air cooled and water cooled. The latter is for bactericidal local and stimulating effect. As yet there is no artificial contrivance which the human mind has been able to devise which equals natural sunlight. The brilliant results of Rollier of Leysin, Switzerland, and Lo Grasso of Adams Memorial Hospital, Perrysburg, N. Y., and others in treatment of surgical tuberculosis are due to natural heliotherapy and not artificial mechanisms. More recently various carbon arc burners have



been employed for the reason that they not only produce ultraviolet but infra-red (heat ray). The latter is now used as a preliminary procedure to ultraviolet therapy, belief being that infra-red paves the way for better action of ultraviolet. This procedure renders a closer approach to sunshine possible.

The principle in treating patients with artificial therapy is to gradually accustom the skin to the beams of sunlight. Whether one uses the localized, generalized or zoning technic, the important desideratum is to avoid heroic exposures, i. e., overdosing, resulting in excessive tanning and traumatization of the skin. For local effect the air cooled lamp is brought down to a distance of one foot from the skin. If used at a closer range than twelve inches, great care should be exercised in treatment because of the so-called chemic burn. For generalized exposures treatments begin at a distance of approximately 40 inches. Anterior and posterior aspects of the body are irradiated at the same exposure. When a photochemical reaction of the skin, i. e., tanning, has been produced, the lamp is cautiously lowered.

In the hands of skilled technicians there is practically no danger from light therapy. Careless and injudicious use may produce first and second degree burns, blistering, conjunctivitis, hemorrhage and various dermatoses.

A few of the cases treated by ultraviolet therapy are now in order.

#### CASE I.

M. S., age 15 months, white, infant, admitted January 3, 1929, for inspiratory stridor and cough.

Full term baby, weight at birth seven and one-half pounds, present weight twenty-five pounds, normal infancy, breast fed until one year. Examination: Diseased tonsils which were very much enlarged; negative otherwise; x-ray examination (1/16/29) indicated a distinct widening of the shadows at the base of the heart which was probably due to a persistent thymus. Eleven generalized irradiations were begun on February 18, 1929, were given at intervals of two to five days, reaching a total of seven minutes. After the first five exposures the

dyspnoea improved considerably. At time of discharge April 9, 1929, cough, stridor and dyspnoea had completely disappeared. X-ray at time of discharge (4/9/29) revealed no appreciable difference in size of thymus than when first roentgenogram was taken.

#### COMMENT

Clinical improvement characterized by disappearance of inspiratory stridor, cough and dyspnoea probably accounted for the beneficent results obtained with ultraviolet irradiations. It is quite likely that the enlargement of the thymus occurred in the anteroposterior diameter and that a reduction of the gland in this diameter was responsible for clinical cure.

#### CASE II.

D. S., eight years, white, was seen November 27, for chronic cough of two years duration, no history of tuberculous contact. Had normal infancy. Measles, age two years. Tonsillectomy, age three years. Chicken pox, age five years. Had been attending various hospital clinics for cough during which time medication of one kind or another was prescribed without any improvement. Examination disclosed a fairly normal chest except for many large rales in right lower base. Tuberculin test (intradermal 1/100 mg., 1/10 mg. and 1 mg. of Koch's old tuberculin) negative. X-ray taken November 29, 1927, more than average thickening throughout the lungs both in the root zones and along the distribution of the bronchial trees. Widening of the shadows at base of heart which may be due to some persistence of the thymus gland. Increase also in the size of the cardiac silhouette. Generalized exposures three times weekly on alternate days were ordered. Twenty-three irradiations were given over a period of three months, total of 15 minutes upon anterior and posterior aspects of body. After first ten exposures definite improvement occurred with complete disappearance of the cough when discharged on March 3, 1928. Weight upon admission January 29, 1927, 62 pounds, upon discharge March 3, 1928, 64 pounds.

#### COMMENT

It is not unusual to secure definite improvement in chronic coughs in children by generalized exposures with ultraviolet light. The modus

operandi is still open to question. It is quite likely that results are brought about by an increase in the calcium of the body when this element is low, also by an increase in the immunologic bodies (leukocytes, phagocytes, etc.).

Non-tuberculous patients with chronic bronchitis seem to fare better by irradiations than those with tuberculous foci. When one realizes that medicinal preparations are often unsatisfactory for treating chronic bronchitis in children, a procedure such as mercury vapor quartz light irradiations promises untold advantages to the therapist.

#### CASE III.

M. G., four years, white, admitted November 9, 1928, for eczema of face and elbows. Breast fed until six months when bottle feeding supplemented. Measles 1926. Stubborn and persistent eczema on face and anterior aspect of elbows which was treated by various clinics without improvement. Localized exposures were given three times weekly with definite improvement after eighteen exposures. Is still continuing treatment once weekly. At time of last examination (May 4, 1929) eczema had almost completely disappeared.

#### COMMENT

Generalized exposures from the mercury vapor quartz light were employed. The irradiations serve as a stimulant in bringing more blood to the skin surface. Improvement possibly results in this manner. Compared to various local medicinal preparations employed for eczema, light therapy is advantageous in that it is easily applied without discomfort to the patient.

#### CASE IV.

C. F., colored, ten months, male, admitted March 27, 1928, for rickets. Chief complaint, sweating head. Artificially fed since birth because of insufficient breast milk. Examination showed delayed dentition, square head, anterior fontanelle wide open, posterior fontanelle slightly open, rachitic rosary, pot belly, diastasis of recti muscles, enlargement at the epiphysis (wrists). Twenty-seven generalized exposures of ultraviolet were given beginning with one minute and increasing gradually to 15 minutes upon an-

terior and posterior aspects of body. Noticeable improvement after ninth exposure. Sweating around head completely improved with better musculature and definite improvement in the roentgenogram picture when discharged June 27, 1928.

#### COMMENT

Ultraviolet light has been known to be a specific in the treatment of rickets for some time. In 1922, Hess, Unger and Pappenheimer were among the first to demonstrate this property of quartz light in this country. In the Hawaiian Islands rickets is a rare disease due to abundance of sunlight present throughout the year, whereas in northern latitudes, where the sun shines sparingly during certain seasons of the year, the incidence of rickets rises. Various foods are now being irradiated and when ingested are said to carry this antirachitic property into the body. The work with irradiated foods is largely due to the researches of Dr. Harry Steenboch of the Agricultural Department, University of Wisconsin.

#### CASE V.

B. K., age seven years, female, white, was admitted February 21, 1929, because of severe malnutrition. The child's mother related that she was always well during infancy but failed to gain sufficiently in weight during the past few years. Medical advice was sought for the child in various clinics and from private physicians without avail. The only symptoms were poor appetite and failure to put on avoirdupois. Three to four glasses of milk were taken, three teaspoonsful of cod liver oil, cereals, vegetables and one soft boiled egg daily. The child retired routinely at 7:30 P. M. but was a poor sleeper. Physical examination revealed a very much undernourished child with flat chest, prominent ribs, winged scapulae, etc. X-ray of chest was negative. Tuberculin test (intradermal Koch's old tuberculin 1/100 mg., 1/10 mg. and 1 mg.) negative. Weight upon admission forty pounds. Generalized exposures, with air cooled lamp given once weekly, twenty-four in number, with the result that in two months and three days the child gained six and one-quarter pounds, appetite and sleep were also improved.

## COMMENT

This constructive property of ultraviolet (long rays) is not unusual. For this reason the irradiations are sometimes referred to as "food rays." Some of the patients in our department gain as much as one pound weekly by generalized routine exposures to ultraviolet.

## CASE VI.

Vincent D. L., age 4 years, white. Admitted March 28, 1928, because of swelling on right side of neck, three weeks duration. Negative family history. Swelling enlarged and fever followed. Swelling was diagnosed as a suppurative adenitis. Glands incised by surgeon and then referred to quartz light department for drainage. Localized exposures of one minute were gradually increased to seven at a distance of one foot every second day. Complete healing at end of ten days. Patient then continued with generalized exposures for tonic effect.

## COMMENT

It is an established fact that ultraviolet is one of the best agents for draining pus, whether this be due to a suppurative adenitis or from osteomyelitic sinuses. A large amount of pus can be evacuated in this manner and healing ensues with amazing rapidity.

## CASE VII.

N. K., age three years, white, male, admitted February 9, 1929. Came to the hospital at suggestion of his family physician who desired the child to receive generalized exposures because of marked pallor. Symptoms consisted of poor appetite, and the patient always had a "washed out" appearance, according to mother.

Physical examination revealed pallor of skin and mucous membranes of lips and conjunctivae, otherwise negative. X-ray—no evidence of Koch infection. Hemoglobin 55 per cent, red blood cells 4,200,000; white blood cells 13,400. Color index .65. Generalized ex-

posures were given twice weekly. On April 24, 1929, pallor improved, appetite became decidedly better. Parents said child had more "pep" after than before treatments. On April 24, 1929, blood count revealed hemoglobin 74 per cent, red blood cells 4,450,000; white blood cells 10,300. Color index .9+. Incidentally, this child gained over two pounds during the period of irradiations.

## COMMENT

Ultraviolet light is now looked upon as a valuable remedy in treating anemias of secondary origin. It is believed that carefully regulated doses of mercury vapor quartz light anchor iron in the body and increase the red blood cells. This is a worthwhile procedure for treating secondary anemia, in the young.

The few cases presented are some conditions benefited by ultraviolet irradiations. Would time permit other patients showing good and bad results could be demonstrated.

In conclusion, it would be well to impress upon you the necessity for greater discretion to be exercised when patients consult you in regard to the purchase of a lamp. The comparatively new form of therapy belongs to the medical profession, who should control its use, and not to cultists who have had no training in its application and who may endanger life by its haphazard use.

Conservatism should replace quick tempered enthusiasm. Carefully carried out research should be conducted by qualified and trained workers of the profession. When this has been accomplished then rationalism will replace empiricism, and when correct principles of light therapeutics have been applied, artificial heliotherapy will be recognized as a standard weapon of value in certain diseases and not the universal tool of the everyday quack.

1426 Spruce Street.

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# EDITORIAL

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## ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

Eighth Annual Meeting,  
November 4, 5, 6 and 7, 1929,  
Hotel Sherman,  
Chicago.



### PHYSIOLOGICAL EFFECTS OF ULTRA HIGH FREQUENCY CURRENTS

With the development of the vacuum tube oscillator a new field of investigation with reference to the therapeutic possibilities of radio frequencies has been opened. It is now possible to study the physiologic effect of ultra high frequency currents that range from 1,000,000 to 200,000,000 cycles per second. Little is known of the biologic effect of these currents, although

it is believed that these higher ranges differ materially from those produced by lower frequencies. Outside of the fact established by McCleendon<sup>1</sup> that the low frequency alternating currents penetrate the fluids between the intercellular spaces, and the higher frequencies ( $10^6$  and up) penetrate the living cell by virtue of its capacitance and the thinness of the film-like dielectric, the apparent effect produced is due to ohmic resistance and dielectric loss just as in diathermy. The available literature on the subject is practically limited to less than a half a dozen papers, two thirds of which deal with the biophysical aspect, and the other third with a theoretical consideration of its therapeutic possibilities.

Probably the first to utilize ultra high frequency radiations was Gosset<sup>2</sup> and his co-workers who demonstrated that plant tumors could be favorably influenced with a radiation exposure of 150,000,000 cycles per second. A peculiarity noted in each instance was the marked stimulation of growth prior to death. Acceleration of metabolism is evidently a corollary of this range of radiation.

More recently Schereschewsky<sup>3</sup> studied the biologic effect of ultra-high frequency currents that ranged up to 135,000,000 cycles per second on a series of 403 rats and transplantable tumors, and concluded that the maximum lethal frequency was present in the band between 20 to 80,000,000 cycles per second. Without this specific region Schereschewsky demonstrated maximum lethal activity. He attributed the effect to a selective action of these wave lengths on the basis of electromechanical vibration of the living cell due to rapid alternations in polarity of the field. He also observed that the temperature of the living and dead mouse varied under the influence of these radiations. While the living animal was able to show a rise in temperature of  $5-6^{\circ}$  C., the temperature in the freshly killed



animal could only be raised to 0.1-0.7° C. in a similar period of time. From this he concluded that the heating effect was different from that observed with a diathermic current of lower frequencies.

Because of the spectacular nature of these conclusions and its probable importance to medicine and the biologic sciences, Schereschewsky's observations soon challenged the interest of Christie and Loomis.<sup>4</sup> Experiments were instituted by these authors to determine, (1) "if the lethal nature of these radiations was truly proportionate to their density, irrespective of their frequency; (2) if certain frequencies had a lethal action of living cells; (3) to determine the actual cause of death in animals subjected to these radiations."

The results of their painstaking investigations do not confirm the findings of Schereschewsky. The effects produced by electromagnetic waves of frequencies ranging from 8,300,000 to 158,000,000 cycles per second on biologic material were found to be based upon the heat generated by the ultra high frequency currents which were induced in them. No evidence was found by Christie and Loomis to support the theory that certain wave lengths have a specific action on living cells. The effect of these radiations was proportionate to the intensity of the electromagnetic field. As the frequency is increased beyond a certain point (50,000,000) the amount of induced current is diminished and the lethal effect is proportionately decreased. The action on transplanted tumors is not a biologic one but rather an effect of protein coagulation due to intense heat, and the variation of temperature in the living and dead animal was found to be relatively the same upon measurement by calorimetric methods.

The results of the foregoing investigations assumes now somewhat the picture of a closed circle. We are back where we started with the satisfactory exception that it has extended the boundaries of our knowledge. The spectacular and the mystical in science is always reduced to commonplace facts on more familiar orientation. With the exception of Nagelschmidt's<sup>5</sup> recent contribution on a "new form of diathermy"

which suggests the utilization of higher frequencies, nothing worthy the name of a scientific contribution in this connection has emanated from the ranks of the clinician. Indeed, because of the vagueness associated with Nagelschmidt's exposition his so-called contribution must be accepted with due reservation.

Our present knowledge of ultra high frequency therapy reduces itself to the fact that only sustained oscillations have been utilized. Under a technic that differs materially from that used in diathermy, general body heating can be affected. These frequencies are known to accelerate metabolic processes, which may stimulate or depress to the point of death. Science has as yet not found a frequency that is specific for malignant growths. Until more is known of these ranges of radiation one should approach its therapy with caution, for it is still in the experimental stage.—D. K.

<sup>1</sup>McClendon, J. F., Amer. J. Physiol., 1927, CXXXII, 525; J. Biol. Chem., 1926, CXIX, 733.

<sup>2</sup>Gosset, A., Gutmann, A., Lakhowsky, G., and Magrow, I., Compt. rend. Soc. Biol., 1924, XCI, 626.

<sup>3</sup>Schereschewsky, J. W., Pub. Health Rep., 1926, XII, 1939; Pub. Health Rep., 1928, XI-iii, 927.

<sup>4</sup>Christie, R. V., Loomis, A. L., Jour. Exp. Med., 1929, XIIX, 303.

<sup>5</sup>Nagelschmidt, F., "A New Method of Applying Heat by Diathermy," Proceedings of the 2nd International Conference on Light and Heat in Medicine and Surgery, London; Actinic Press, 1928.

## SOME REPRESENTATIVE VIEWS

[Continued from the July issue.]

*In view of certain statements in the Medical Research Council's Report, a number of medical men with considerable experience in artificial light therapy were asked by the editors to make some observations on the value of this treatment, based on their own clinical experiences and results, in the light of the Report. So many and so extensive were the letters received on this subject that it has been found impossible to publish more than a representative selection of extracts in this issue. These appear hereunder, and it is hoped to supplement these by further extracts in our next issue.*

SIR WILLIAM WILCOX, K.C.I.E., C.B., C.M.G., M.D., F.R.C.P., Physician to St. Mary's Hospital, W.: For the last few years artificial light has been employed in the treatment of spe-

cially selected cases under my care at St. Mary's Hospital, London. In the treatment of these cases I have had the advantage of consultation with my colleague, Dr. Justina Wilson, who is in charge of the special department in which light treatment is utilized. Dr. Wilson has herself supervised the administration of the treatment and has carefully noted the effect produced.

The cases selected for treatment have for the most part been patients suffering from chronic and progressive toxæmia of various kinds. Thus fibrositis, anæmia, pernicious and secondary, chronic arthritis, ulcerative colitis, abdominal tuberculosis, etc., have been examples of diseases of which a considerable number of each have been treated.

The preliminary investigation of these cases has involved a search for, and adequate eradication or treatment of any existing focal infection. In the subsequent treatment in hospital, progress has often been slow and delayed. It is at this stage that I have found artificial light of undoubted great advantage. Its careful administration is followed by a raising of the immunity of the patient to the existing toxæmia, and is accompanied by a progressive improvement in nutrition, in the blood condition, and in the increased rapidity of return to good health. In these cases strong erythema doses have been carefully avoided.

I have no doubt whatever as to the value of artificial light in cases of chronic toxæmia for which any existing gross focus of infection has been removed. The progress in these cases after treatment with artificial light has been most marked, and has greatly exceeded that in patients who had not had the advantage of this supplementary treatment.

During the last two months I have had three cases of marasmus in children where the slow improvement on a special diet rich in vitamins was markedly accelerated by the administration of artificial light treatment.

The artificial light administered has not been confined to the ultraviolet rays from the mercury vapor lamp, but has been carefully se-

lected from sources suitable to each case, such as the carbon arc lamp, tungsten lamp, or a combination of these.

The value of natural sunlight suitably adjusted has been overwhelmingly proved in cases of chronic infections such as tuberculosis, etc. The admirable work of Dr. Rollier in Switzerland and Sir Henry Gauvain in this country has shown that heliotherapy has a therapeutic value in the treatment of chronic tubercular bone affections which no other form of treatment can approach.

Unfortunately the many cases of chronic infections which one has to deal with in the hospitals in this country cannot avail themselves of natural sunlight treatment, and surely it is reasonable and scientific to give these cases "the next best thing," namely, artificial light carefully administered so that to some extent the benefits of natural sunlight may accrue.

The report of the Medical Research Council is of value in calling attention to the useless, and unnecessary administration of artificial sunlight to children who would be better employed playing games out of doors and given suitable food to satisfy the appetites thereby created. It will be most unfortunate, however, if the pessimistic conclusions from negative results of artificial light on a few groups of school children who would have been better employed at games out of doors on a suitable and ample dietary, should act as a deterrent to the use of artificial light in those cases of debility and chronic toxæmia which are so numerous in our hospitals, and also in our over-crowded districts where unemployment is rife, and adequate dietary not available.

Artificial light has an important place in modern therapeutics. It should be used in those carefully selected cases where some immunity stimulus is called for. Further research is required as to the physiological effects produced by its action, not only on normal persons, but especially on those who are suffering from ill health due to chronic disease.

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JUSTINA WILSON, F.R.C.P., (Edin.), D.M.  
R.E. (Camb.), Physician i/c Electrotherapeutic

and Light Dept., St. Mary's Hospital: The report of the Medical Research Committee emphasizing negative results will not influence the opinion of those who have had years of clinical experience in this work in the wards and out-patients' departments of our general hospitals, and who are convinced by the clinical results, supported by pathological investigations, that ultraviolet light therapy is of true benefit.

Light therapy is not so much a specified remedy for any particular form of disease as a rational attempt to supply the natural want of human beings for sunlight in a country where they are deprived of its healing powers for months on end. Nor is it a cure-all. There are, however, other certain well defined indications for its use than those mentioned in the report, viz.:

1. Rickets where it is apparently regarded as a wasteful mode of therapy compared with cod liver oil.

2. Its power of exciting local inflammatory reactions in the skin, resulting in a very temporarily increased bactericidal power of the blood, which can be as efficiently and more cheaply brought about by mustard plasters.

There is no doubt that rickety children do well on cod liver oil and on light. They do still better when that cod liver oil is irradiated by ultraviolet light, and best of all when the irradiation is extended to their flabby little bodies. Apart from the x-ray findings, serological examinations, etc., they regain vigor, vitality and muscle tone far more rapidly when treated by light than they do when treated by cod liver oil only. That alone would justify the use of light in a hospital or clinic where an expenditure of £50 for two mercury vapor lamps and another £10 for a radiant heat lamp of sufficient candle power is not an excessive amount considering the benefits gained by it.

Could any form of therapy show convincing results if applied to normal patients? Pessimists in search of positive results should attend the out-patients' department of any general hospital where the technic of light therapy is understood. To take one series of cases only, that of children suffering from surgical tuberculosis of bones, joints, glands, tubercular peritonitis, or

from any form of osteomyelitis. It is true that the value of heliotherapy is infinitely greater here, but as sunlight is unobtainable in London and many of our great cities for six months of the year, are 50 per cent of our patients to be debarred from the benefits of artificial sunlight? It is just in the treatment of surgical tuberculosis that this has its greatest triumphs. Here ultraviolet light is not a specific as it is in rickets, but a great adjunct, and its tonic effect on these ill-nourished, anæmic, and suffering children is remarkable.

The relief of pain in bone and joint conditions is immediate. In four weeks, glands the size of hazel nuts have disappeared or become almost impalpable. Enlarged glands at the hilum are shown by x-rays to be half their original size. Discharging sores and sinuses are healed. These children *do* increase in weight. Appetite and spirits return, and they show a remarkable resistance to infections of the respiratory tract.

We use light therapy in our wards and out-patients' largely for the relief and cure of bronchitis in children, and the results are good. After a three months' course of general ultraviolet light baths, given twice a week, children who had bronchitis four or five times every winter rarely get it again. Exposed as they are to massive infections they may, it is true, catch occasional colds, but they are well in three days, and bronchitis is rare.

Especially valuable is light in the treatment of measles convalescents. These children have a very low resistance to the tubercle bacillus, and their bronchial tubes are irritable. Light therapy gives excellent results both as regards complete cure and prophylaxis.

Children are not the only patients who benefit by ultraviolet therapy. In all conditions of marked debility, in convalescence from fevers and other infections, in post-operative conditions associated with loss of blood and anæmia, light is a great ally both to physicians and surgeons, and extensive use is made of it in our wards as it undoubtedly shortens convalescence. In the treatment of infected wounds and ulcers, especially varicose ulcers (here again we are at variance with Dr. Colebrook), the bactericidal power



of ultraviolet is of more value than treatment by solutions of silver and other salts, or scarlet ointment. Provided the proper technic is followed, resorption is hastened, epithelization stimulated, and pain relieved more quickly by light than by Unna's paste. Many conditions of abdominal pain, especially spastic conditions, such as colitis, are relieved by light. Also the pain from intraperitoneal adhesions. Ultraviolet light stimulates callous formation, and increases the phosphorus and calcium content of the blood; therefore we use it largely in the healing of ununiting fractures. Scars and painful contractions are softened and healed by it.

There is no doubt that exaggerated claims are daily made regarding the results of this mode of therapy. Light cannot cure any and every disease, and there are important contra-indications for its use. It can only show good results in the hands of physicians really experienced in its use. In such hands, ultraviolet light represents an invaluable adjunct in therapeutic treatment.

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JAMES JOHNSTONE, M.B., Ch.B., D.P.H., (Camb.), Physician-Superintendent, Hairmyres Colony, East Kilbride: At this institution, we have carried out actinotherapy in the treatment of the non-pulmonary types of tuberculosis for the last six years. Basing my observations on practical experience, I have no hesitation in stating that the introduction of ultraviolet rays for the treatment of those cases has practically revolutionized our ideas. It can be compared with artificial pneumothorax for pulmonary tuberculosis.

In my annual report for last year, which I hope to publish this month, I show that 63 per cent of the cases treated were discharged "cured"—a result which speaks for itself.

We all know, or ought to know by this time, that tuberculosis is a general disease, and, during treatment, all cases must receive general light baths; in other words, the whole body must be exposed to the beneficial rays. How could you do this with a mustard plaster? Again, it would not be feasible to apply a mustard plaster to a gland with a discharging sinus, and it is

well known that this type of case responds markedly to light treatment.

It seems to me that the success of actinotherapy in the treatment of tuberculosis depends on the gradual stimulating effect produced by measured doses of ultraviolet rays over a prolonged period, an effect produced by no other agent, and a marked contrast to the violent local reaction of a mustard plaster.

Actinotherapy has, obviously, to any person with any knowledge of the subject a great future before it. The report by the General Medical Committee seems to me to be putting back the hands of the clock.

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E. P. CUMBERBATCH, M.A., M.B., B.Ch., D.M.R.E., Medical Officer i/c Electrical Dept., St. Bartholomew's Hospital: In making a short statement of my views on the general utility of ultraviolet light treatment, I would reply that I have found it of considerable value in improving the health of adults and children.

It is admitted by the Medical Research Council that ultraviolet light is a useful auxiliary in the treatment of lupus and surgical tuberculosis. Indeed it would be difficult to find anyone who has had experience of this who would doubt it. Ultraviolet light is not a specific in such cases, but acts in producing a resistance due to improvement in the general physical condition of the patient. As it is not a specific for tuberculosis it follows that a similar improvement can be produced by it in other conditions.

The effect of ultraviolet light in dermatitis and other skin affections of bacterial origin in producing a healthy skin when other remedies have failed, is a matter of common experience.

There is no reason why ultraviolet light should cure ulcers dependent on varicose veins, but ulcers due to dermatitis are more rapidly cured by it than by any other means.

The above is intended to deal only with one or two points in the report referred to. It is obvious that it cannot be fully discussed in the space available.



H. DOVE CORMAC, M.B., D.P.M., Medical Lecturer in Psychological Medicine to the University of Manchester: Actinotherapy as at present practiced at this hospital was not introduced without previous experiment and careful consideration of its value. A cheap cinema carbon arc lamp was installed, and the results of treatment of 50 mental patients, extending over a period of twelve months, were studied as to gain or loss of weight, blood pressure, blood count and basal metabolic rate, as well as the effect on the mental state. The beneficial effects observed in treated cases appeared to be of sufficient value to justify me in recommending to the committee of the hospital that further conventional types of carbon arc and mercury vapor lamps should be installed.

Further, irradiation for eight weeks with the carbon arc of seven female nurses, for the purpose of an experiment, resulted in increased vigor and activity and a gain in weight by every individual, varying from two to six pounds, which in the aggregate amounted to an average increase of three pounds five ounces. There was no alteration of the dietary before, during or after the treatment.

After four years' experience I have no hesitation in asserting that, although other factors such as occupation therapy, recreation, improved dietary, rest, etc., all play a prominent part in promoting recovery, irradiation is a most powerful adjunct in the treatment of certain mental disorders.

Achelis and Rothe have shown that the action of ultraviolet radiation on a sensory nerve is first to increase its sensitivity for a short period, and then to decrease the sensitivity. The period of diminished sensitivity was always constant and more prolonged than the period of hyper-sensitivity. I have noted in the mental state a corresponding variation in certain types of cases, and it is by the decrease of the hyper-sensitive condition of the mental state in some forms of melancholia that its beneficial effects are produced. Further, the initial hyper-sensitivity produced by irradiation converts the playful, frivolous and hyper-active case of mania into a veritable fiend for a couple of hours. I believe irradiation has a profound influence on

the nervous system, and that there is a rational physiological basis for the use of actinotherapy in mental illness of certain types.

Having read the Medical Research Council's report, my views of the value of actinotherapy, based on clinical experience extending over four years, remain unchanged.

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ALBERT EIDINOW, M.B., B.S., M.R.C.S., L.R.C.P.: I have obtained and seen many excellent results with artificial light treatment.

The Medical Research Council's report urges the publication of details of clinical results. Despite the present confusion I would like to take this opportunity to urge all clinicians to publish a classified summary of the results of the cases they have treated, and their technic. I am sure that the only reply to this report is the publication of such matter.

Indiscriminate use of radiation has already done much damage to the progress of actinotherapy. Its future is at present in the balance. Progressive research both in the laboratory and in clinical practice can only establish its final triumph. The Medical Research Council's report has inadvertently added to this present confusion.

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A. H. LAIRD, M.B., D.R.M.E. (Cantab.): The following general remarks are based entirely on cases treated by myself, and are in no sense influenced by any statements appearing in the literature of ultraviolet light.

I have found ultraviolet light of great value in the following cases:

#### I. CHILDREN

a. The intelligent, merry, highly-strung child—the kind of child that won't go to the top of the house alone, even in "broad daylight"—the type that wakes up at night screaming.

b. The sluggish type of child, variable in its appetite, what the old writers used to call scrofulous.

c. Chorea.

d. Tubercular peritonitis.

e. General debility.

General remark—I have been eighteen years in general practice, and know of no line of treatment as serviceable for (a) and (b) as ultraviolet light.

## II. ADULTS

- a. Colitis—a case of 6-8 years standing—no recurrence in two and one-half years.
- b. Nervous, highly-strung women.
- c. Oedema of leg below a large constricting scar—traumatic.
- d. Myalgia and allied conditions, especially lumbago.
- e. Psoriasis.
- f. Eczema chronic.
- h. Pernio.
- i. Myocarditis.
- j. Mental depression.
- k. Headaches of the lymphatic type.

One patient had suffered from such for about ten years, resisting many kinds of treatment. Now rarely has any headaches, and if such occur, are not severe.

- l. General debility—at all ages.

I do not for one moment, however, imagine that the council expects any rational set of men to accept the findings of their very limited investigations as against the much more extensive and often quite as scientific findings of others.

For example, I wonder how many of the council have ever read Bernhard's and Mayer's works. I should greatly like to know if the council is of opinion that they can produce as good statistics in intestinal tuberculosis by the mustard plaster as Mayer gives on pages 252 to 253 of his work on the "Clinical Application of Sunlight and Artificial Radiation." I presume the council has made extensive investigations into the effects produced by the mustard plaster. They surely cannot claim that the effects of the plaster are the same as those produced by ultraviolet light unless such investigations have been made. It is a pity that they have not published their results.

G. MURRAY LEVICK, M.R.C.S., L.R.C.P.:  
The Medical Research Council's remarks on the subject of artificial light treatment are not likely

to be remembered very long either by the public or the medical profession, but they have at least served one useful purpose—namely, to provide a good example of the way in which an established and valuable treatment may fail in the hands of people without the right clinical experience.

Among other unsupported statements, this report states that cod liver oil is just as effective as artificial light treatment. Those of us who have administered this treatment know, of course, the fallacy of this conclusion. But I have a letter from a medical colleague whose small son I treated recently by artificial light. The case is so typical of many others that it is worth quoting. The father says:

"For nearly two years I had been giving him cod liver oil of the best brands obtainable—also extracts of cod liver oil and many of the other usual preparations—to increase his nutrition, and he was having grade A milk, and the most nourishing food. In spite of these extras he did not develop satisfactorily. Last October I asked your opinion as to probable effect of light and you were strongly in favor of trying it. He had twelve applications before Christmas, 1928, and after the first half dozen began to show very obvious improvement, and by Christmas was quite a different child, even having good color and showing greatly improved nutrition."

As the parent who writes this is a consultant physician of repute, such independent observation is not without value.

C. CONYERS MORRELL, M.D. (Brux.), D. P.H. (Lond.): I can state from considerable experience that many cases of fibrositis, lumbago, etc., which have failed entirely to be relieved by the application of mustard plaster or other counter-irritants, have responded readily to ultraviolet radiotherapy, with not only temporary, but lasting benefit. Clinical evidence shows that there can be no possible doubt as to the marked superiority of such radiotherapy measures over counter-irritants in a very large proportion of these cases.

If mustard plasters are as efficacious as radiotherapy, it is surely remarkable that med-

ical men should, after prescribing the application of mustard plasters, and finding these ineffective, resort to radiotherapy.

In many such cases, for which I can vouch, ultraviolet radiotherapy is carried out in the case of poor patients at the doctor's personal financial loss, and most certainly without any "strong commercial" advantage. If we read the report aright, it would seem that such doctors must be greatly lacking in the scientific qualities and in the ordinary powers of observation and deduction of which the council appears to consider it has the prerogative.

We are actually told that the researches carried out by the council give "the real, and perhaps at present, the only sanctions for light treatment." It follows that any conclusions, not in accordance with its own, reached by scientists of unquestionable repute, both medical men and physicists, in this and also in other countries, count for little or nothing.

The very confused statement respecting heliotherapy, in which it seems to be taken for granted that most, perhaps all, investigators have entirely ignored the biological effects of rays emitted from the sun other than the ultraviolet, leaves considerable doubt as to how far the scientific literature of this and other countries has been consulted by the council.

R. J. MINNITT, M.D.: From my personal experience of ultraviolet light treatment I have not the slightest hesitation in saying that its effect upon certain patients suffering from pathological conditions is of the highest importance. Sleep is promoted, appetite and weight improved, resistance to suppurative disease increased, and poverty of blood cells diminished. It has proved of inestimable value in severe anæmia and also in a case of septic peritonitis which was resistant to all other forms of treatment.

In my opinion the statements contained in the Medical Research Council's report have been made on insufficient evidence, depending on experiments conducted on more or less healthy individuals, and should not have been published in the press at this stage.

## COURSE OF INSTRUCTION IN PHYSICAL THERAPY

Sponsored by

American Electrotherapeutic Association  
and

Western Association of Physical Therapy  
Indianapolis, Indiana

September 9th and 10th, 1929

### PROGRAM

MONDAY, SEPTEMBER 9, 1929

#### Morning

- 8:00-10:00—Registration.
- 10:00—Quartz Light, Basic Principles. Edwin N. Kime, M.D.
- 11:00—Static Currents, Principles Governing. Charles R. Brooke, M.D.
- 12:00—The Constant Current, Principles and Therapy. J. E. G. Waddington, M.D.

#### Afternoon

- 2:00—The High Frequency Machine. Burton Baker Grover, M.D.
- 3:00—High Frequency Surgery, Basic Facts. A. David Willmoth, M.D.
- 4:00—Hydrotherapy Practice. John W. Torbett, M.D.
- 5:00—Vibration, Principles and Technic. Mary L. H. Arnold Snow, M.D.

#### Evening

- 8:00—Medical Diathermy, Fundamental Biophysics. Disraeli Kobak, M.D.
- 9:00—Luminous and Infra-red Rays. Curran Pope, M.D.

TUESDAY, SEPTEMBER 10, 1929

#### Morning

- 8:00—Wave Currents. J. E. G. Waddington, M.D.
- 9:00—Static Currents, Therapy Demonstration. William Martin, M.D.
- 10:00—High Frequency Therapy. Frederic de Kraft, M.D.
- 11:00—Carbon Arc Light, Principles and Therapy. James C. Elsom, M.D.

#### Afternoon

- 2:00—Fractional X-Ray Therapy. William Benham Snow, M.D.
- 3:00—Physical Therapy Practice, Symposium. Curran Pope, M.D.; William Martin, M.D.; John W. Torbett, M.D.; William Benham Snow, M.D.
- 4:00—Desiccation, Demonstration. William L. Clark, M.D.
- 5:00—Diathermy in Gynecology. A. David Willmoth, M.D.

#### Evening

- 8:00—Physical Therapy in Treatment of Insane. Henry A. Cotton, M.D.

- 9:30—Electrosurgery. William H. Schmidt, M.D.  
 10:00—Valedictory. William Benham Snow, M.D.

All registrants for Course of Instruction are cordially invited to remain over and attend the joint session of the two associations.  
 joint session of the two associations.

Fee for Course of Instruction, \$15.00 to cover expenses.

For registration blanks and further information, address C. C. Vinton, M.D., Secretary, 47 Willow Street, Brooklyn, N. Y.

### PROGRAM

of the Joint Session of  
 The American Electrotherapeutic Association  
 and  
 The Western Association of Physical Therapy,  
 Indianapolis, Indiana  
 September 11 to 13, 1929

WEDNESDAY, SEPTEMBER 11

#### Morning Session

Executive Session: 9 A. M.

Scientific Session: 9:15 A. M.

1. Photosensitization. Frank Thomas Woodbury, M.D., New York City.
2. The Biochemistry of Ultraviolet Radiation. Dr. Sherman Davis, Professor of Chemistry, Indiana University School of Dentistry.
3. The Importance of Clear Fused Quartz in Science and Industry. Dr. Edward R. Berry, West Lynn, Mass.
4. Injuries Resulting from Ultraviolet Radiation. Henry Schmitz, M.D., Chicago, Ill.
5. Physical Therapy in General Practice. E. L. Libbert, M.D., Lawrenceberg, Ind.
6. Phototoxemia. Dr. F. Foveau de Courmelles, Paris, France.

Wednesday Afternoon Session, 2 P. M.

#### *Symposium on Electrosurgery and Malignancy*

7. The Use of the So-called Cutting Current in surgery of the Female Breast. A. David Willmoth, M.D., Louisville, Ky.
8. Rational Cancer Routine. George A. Wyeth, M.D., New York City.
9. X-Ray Treatment of Superficial Malignancy. W. E. Pennigton, M.D., Indianapolis, Ind.
10. Current Literature on High Frequency Current—a Resume. Frederic de Kraft, M.D., New York City.
11. High Frequency Currents. Burton Baker Grover, M.D., Colorado Springs, Colo.
12. The Constant Current in the Treatment of Affections of the Mucous Membrane. Frederick H. Morse, M.D., Boston, Mass.

Wednesday Evening Session, 8 P. M.

13. Address of Welcome. Hon. Harry Leslie, Governor of Indiana.
14. Address. Murray Hadley, M.D., President, Indianapolis Medical Society.
15. Address. Dr. W. F. King, Commissioner of Health, Indianapolis.
16. The Sympathicus in Relation to Physical Therapy. (Presidential Address, American Electrotherapeutic Association.) Burton Baker Grover, M.D., Colorado Springs, Colo.
17. Physical Therapeutics: Its Role as a Specialty in Medical Practice. (Presidential Address, Western Association of Physical Therapy.) Edwin N. Kime, M.D., Indianapolis, Ind.

SEPTEMBER 12

#### Thursday Morning Session

Executive Session: 9:00 A. M.

Scientific Session: 9:15 A. M.

#### *Symposium on Gastroenterology*

18. Gastrointestinal Motor Insufficiency, its Physical Treatment, and Illustrative Cases. C. F. Voyles, M.D., Indianapolis, Ind.
19. The Abnormal Cecum and Terminal Ileum and Its Treatment. George J. Ott, M.D., Boston, Mass.
20. Physical Therapy Treatment of the Insane. Henry A. Cotton, M.D., Trenton, N. J.
21. A Critical Review of the Recent Advances in Dietetics. John W. Torbett, M.D., Marlin, Texas.
22. Vibratory Effects Upon the Spinal Reflexes. Mary L. H. Arnold Snow, M.D., New York City.
23. Central Galvanism in the Treatment of Lesions of the Spinal Cord and Brain. Charles R. Brooke, M.D., Newark, N. J.

Thursday Afternoon Session, 2 P. M.

24. Coccygodinia. S. Grover Burnett, M.D., Kansas City, Mo.
25. The Scope of Physical Therapy with Particular Attention to the Static Modalities. William Benham Snow, M.D., New York City.
26. Static Electricity. H. G. Wahlig, M.D., Sea Cliff, N. Y.

#### *Symposium on Gynecology*

27. The Use of Diathermy in the Treatment of Pelvic Inflammatory Diseases. William H. Schmidt, M.D., and Lewis C. Scheffey, M.D., Philadelphia, Pa.
  28. Dysfunctions of the Pelvic Viscera. John Hunter, M.D., Toronto, Canada.
- Annual business meeting for Fellows only,  
 4:30 P. M.



Thursday Evening Session, 7:00 P. M.  
*Testimonial Dinner and Banquet*  
 To Dr. Curran Pope, Louisville, Ky.  
 Toastmaster: John W. Torbett, M.D.,  
 Marlin, Texas.

## SEPTEMBER 13

Friday Morning Session, 9:00 A. M.  
*Symposium on Treatment of Orthopedic Conditions*

29. Treatment of Arthritic Conditions by the Static and Other Electric Currents. William Martin, M.D., Atlantic City, N. J.
  30. Physical Therapy in Chronic Arthropathy. Charles P. Emerson, M.D., Professor of Medicine and Dean of Indiana University School of Medicine.
  31. Physiotherapy in Orthopedic Affections. George E. Deering, M.D., Worcester, Mass.
  32. The Physical Therapy Treatment of Athletic Injuries. James C. Elsom, M.D., Madison, Wis.
  33. Hydrotherapy Lay and Medical. Curran Pope, M.D., Louisville, Ky.
- Friday Afternoon Session, 2:00 P. M.
34. Cryoaerotherapy (Cold Air Treatment).

- A. B. Olsen, M.D., Battle Creek, Mich.
35. Education in Physical Therapy. Edwin N. Kime, M.D., Indianapolis, Ind.
36. Rational Teaching Methods in Physical Therapy. Disraeli Kobak, M.D., Chicago, Ill.
37. The Relative Value of Various Physical Therapy Modalities. Elmer F. Otis, M.D., Melrose, Mass.

Friday Evening Session, 8:00 P. M.

38. Physical Therapy in Ophthalmology and Otolaryngology. Carl B. Spath, M.D., Indianapolis, Ind.
39. Evaluation of the Technics of Physical Energies in Otolaryngology (motion picture demonstration). A. R. Hollender, M.D., Chicago, Ill.
40. Mal de Mer—Its Prevention and Treatment. I. D. Mishoff, M.D., Milwaukee, Wis.
41. Low Tension Wave Currents. Richard Kovacs, M.D., New York City.
42. Physical Therapy Nomenclature. Frederic de Kraft, M.D., New York City, and James C. Elsom, M.D., Madison, Wis.

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# THE STUDENT'S LIBRARY

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## BOOKS RECEIVED

This column is devoted to acknowledgment of the books received. Such acknowledgment must be regarded by the sender as sufficient recognition of the courtesy until time and space permit selections to be made for review.

**SURGICAL RADIOLOGY.** By A. P. Bertwistle, M. B., Ch.B., F.R.C.S., Ed. Late Resident Surgical Officer, General Infirmary at Leeds; with an introductory by D. P. D. Wilkie, O.B.E., F.R.C.S., Prof. of Surgery, University of Edinburgh. 142 pp., 21 illustrations. Philadelphia: P. Blakiston's Sons & Co. Price \$3.50.

**"PROCTOLOGY." A TREATISE ON THE MALFORMATION, INJURIES AND DISEASES OF THE RECTUM, ANUS AND PELVIC COLON.** By Frank C. Yeomans, A.B., M.D., F.A.C.S., Prof. of Proctology, N. Y. Polyclinic Medical School, Fellow and Past President, American Proctologic Society, Attending Surgeon N. Y. Polyclinic Hosp., and New York City Cancer Institute; Proctologist The New York Hospital. With 417 illustrations, 4 colored plates and 660 pp. New York: London, D. Appleton & Company.

**CHRONIC (NON-TUBERCULOUS) ARTHRITIS; PATHOLOGY AND PRINCIPLES OF MODERN TREATMENT.** By A. G. Timbrell Fisher, M.C., F.R.C.S. (Eng.). Late Hunterian Professor, Royal College of Surgeons of England, 1921 and 1922; Surgeon (with charge of out-patients) Seamen's (Dreadnaught) Hosp., Greenwich; Joint Lecturer on Operative Surgery, London School of Clinical Medicine; Visiting Surgeon in Charge of Special Clinic, Ministry of Pensions Hospital, Orpington, Etc. With 186 illustrations contained in 93 plates (1 colored) and the Text, 232 pp. Price \$7.00. New York: The Macmillan Company, 1929.

**THE NATURE OF THE PHYSICAL WORLD.** By A. S. Eddington, M.A., Ltd., D.Sc., F.R.S. Plumian Professor of Astronomy in the University of Cambridge. The Gifford Lectures, 1927. 353 pp. Price \$3.75. New York: The Macmillan Company, Publishers.

**RADIUM TREATMENT OF CANCER.** By *Stanford Cade*, F.R.C.S. (Eng.), Assistant Surgeon, Joint Lecturer on Surgery and Teacher of Practical Surgery, Westminster Hospital. Late Hunterian Professor and Arris and Gale Lecturer Royal College of Surgeons of England. With 13 colored plates and 49 text figures. 154 pp. New York: William Wood & Company. 1929.

**WHAT EVERYONE OUGHT TO KNOW."** By *Oliver T. Osborne*, M.D., Prof. of Therapeutics, Emeritus, Medical Dept., Yale University, Fellow of American College of Physicians, Editor of Therapeutic Section Journal of the American Medical Association 1907-1917, etc. 304 pp. Price \$2.50. Springfield, Ill.: Charles C. Thomas.

## BOOKS REVIEWED

**PHYSICAL THERAPEUTIC TECHNIC.** By *Frank Butler Granger*, M.D., Late Physician-in-Chief, Dept. of Physical Therapeutics, Boston City Hospital; Director of Physical Therapy, U. S. Army; Medical Counselor, U. S. Veterans Bureau; Member of Council of Physical Therapy, A. M. A.; Inst. of Physical Therapeutics, Harvard Medical School; Asst. Prof. of Physical Therapy, Tufts Medical School. Foreword by *William D. McFee*, Boston, Mass. Octavo 417 pages with 135 illustrations. Cloth. Price \$6.50. Philadelphia: W. B. Saunders & Co., 1929.

So many synopses, outlines and indices of physical therapeutics have flooded the advertising pages of our medical journals that the general practitioner who is seeking some guide to direct him in his physical therapeutic technic is bewildered in his choice. Most of them are designed for the general practitioner but few of them fulfill his requirements. One extreme or the other is usually encountered. Either the book is too technical and too theoretical requiring too much and too complicated a supply of material and personnel, or it is too brief and directional. The great majority have had to turn to the pamphlets of the manufacturers or jobbers to obtain the information sought.

Doctor Granger has attempted to "collect information for the physician who has installed a limited equipment, of whom the Council on Physical Therapy of the American Medical Association said, 'A physician who has installed a diathermy machine or an ultraviolet ray generator can do good in carefully selected cases with one of these methods. He is not, however, fully equipped to render physical therapeutics. As a rule, it is the careful combination of several physical agencies that gets the best results.'"

In his organization of this material, he has arranged his material in seven main groups although each separate subject has been included in a chapter by itself. After first giving the physician the fundamental terms and definitions with which he will come in contact, he undertakes to briefly outline the physiological effects produced by electricity. His next task is to explain the various modalities employed under the general heading of physical therapeutics and to show their physiological applications. To further clarify this work he includes the didactic outline synopsis for teaching physical therapy. He presents his concept of a satisfactorily

equipped and arranged hospital department of physical therapy. Individual chapters are devoted to the consideration of various diseases and systems to which the physical measures are most applicable. This he follows with an index of diseases for which he sketches the methods that may be employed most effectively in their amelioration.

"They are the results, however, of my personal experience in physical therapy covering a period of twenty-five years. They represent the combined experiences of one keen observer not the acquiescence of an official council, medical school or hospital. This text comes as near to the fulfillment of its object and the general practitioners' need as any work we have yet had the pleasure of reviewing.

**DIE DIATHERMIE (Diathermy).** By *Joseph Kowarschik*. Primararzt und Vorstand Des Institutes Fur Physikalische Therapie Im Krankenhaus Der Stadt Wien in Lainz; Six Edition, with 125 illustrations, Verlag, Von Julius Springer Wien und Berlin, 1928.

In an unusually short period of time the present work has gone through six editions. The present edition is materially an improvement over the previous ones, and summarizes all that is worth while in this branch of medicine. Kowarschik has incorporated his rich experience into the pages of this volume and every chapter is a masterly exposition. In critically surveying the contents of this work, one becomes cognizant that it has been written by a person saturated in the very fundamentals of the subject. Step by step the student and reader is gradually but intelligently introduced into every phase of diathermy. The author first initiates the reader by an historical survey of high frequency therapy. Von Zeynek, it is shown, was probably the first to recognize the value of thermopenetration and the author only accepts the contributions of Nagelschmidt as a possible contender, but not the originator, to the first honors of this branch of medicine. The author has tactfully dedicated the contents of this volume to the thinking and progressive physician, and not as mere "introduction to the laying on of electrodes." Following an exposition of the meaning of what diathermy actually is, its history and the position of diathermy in thermo and electrotherapy, the author leaves behind all suggestions of polemic discussions and

enters fully upon his subject. The physics, instruments and technic of diathermy as well as its physiological effect is dealt with in separate chapters. All of this is written with fine details, clarity and balance. Indications, contra-indications and the clinical application of diathermy and the various technics employed by the author are included with critical comments that is of great value. There is no padding of material. The author has included at the end of his book one of the finest bibliographies on the subject. Kowarschik has undoubtedly contributed the most scientific exposition on diathermy in any language. This book is heartily recommended to the profession.

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**THE ROLE OF THE GASTROSCOPE IN GASTRIC DIAGNOSIS.** (Die Gastroskopie im Rahmen der Klinischen Magendiagnostik) Kurt Gutzeit, Breslau (also appeared in "Ergebnisse der inneren Medizin und Kinderheilkunde, Vol 35. 97 pp., 46 illustrations. Berlin: Julius Springer, 1929.

This monograph summarizes the results of studies made over a four year period to determine the comparative diagnostic value of roentgenologic and gastroscopic diagnosis in gastric disease and also their usefulness in combination. Five hundred patients with gastric lesions were examined and their courses followed by use of both the x-ray and gastroscope as well as by the usual clinical methods. Gutzeit lays down the rule that the use of the gastroscope should be avoided whenever its passage meets substantial difficulties. To the strict observance of this rule is given the credit for the avoidance of any serious instrumental mishap in this series of 500 cases. It may be suggested, however, in this connection that gastroscopy in such expert hands appears to be a thoroughly safe procedure.

Gutzeit's attitude toward both methods of examination is judicial and non-partisan. He demonstrates that each method has its own particular diagnostic field. Gastroscopy reveals much of diagnostic value which the x-ray and other diagnostic methods only hint at. On the other hand the x-ray permits us to visualize gross pathology in areas beyond the reach of the gastroscope.

No reference is made in this monograph to any experience with the new intragastric camera and serial picture apparatus.—R. T. Vaughan, M.D.

**RADIUM TREATMENT OF CANCER.** By *Stanford Cade, F.R.C.S. (Eng.)*, Assistant Surgeon, Joint Lecturer on Surgery and Teacher of Practical Surgery Westminster Hospital. Late Hunterian Professor and Arris and Gale Lecturer, Royal College of Surgeons of England. Pp. 158, with 13 colored plates and 48 text figures. Price \$5.50. New York: William Wood & Co., publishers, 1929.

Here is a book written by a surgeon who entered the study of radium therapy with the clear intent that it should be an adjuvant to his wider usefulness to his patient. He states in his preface: "If the choice of treatment in a given case of cancer depends upon a surgeon not conversant with the possibilities of radium, the choice will inevitably be surgery; the converse is true and is applicable to the radiologist. Radium needs a surgery of access and surgery needs radium if the best is to be given to the patient. Radium treatment of cancer is in its infancy; it demands special knowledge, and in those who are using it an aptitude to adapt themselves to new lines of thought and new methods of technic." It is clearly to be seen that the author approaches his thesis in an unbiased and tolerant manner. The book is an intelligent survey of the usefulness of radium as an adjuvant to the surgery of malignant conditions and is a digest of the author's personal experience over a period of five years treatment at the Westminster Hospital in London.

Since the author is a surgeon and familiar with surgery of cancer and that of diathermy, this book is doubly authoritative because of its background. The subject of radium therapy is discussed from every practical angle. Special chapters are devoted to the physics, physiologic effects and the principles of radium treatment. There is a frank and earnest enthusiasm that enlists the attention of even those that are inclined to other views. The material incorporated in the pages of this volume practically sketches every known phase of malignancy, and is written in a clear and concise manner. The text is thoroughly illustrated, in part in color, with clear type that is easily readable. Malignancy of every possible location is discussed, and a wealth of practical information is included. A rich bibliography is appended after each chapter. This is by far one of the best books that has recently been published on radium treatment of cancer. The publishers are to be complimented on the clear get-up of this very fine book. The reviewer heartily recommends this book to the profession.



# INTERNATIONAL ABSTRACTS

**Zur Paraffintherapie Der Rheumatischen Erkrankungen.** (Note on the paraffin therapy of rheumatic diseases.) Oskar Vontz. *Munchn. med. Wochenschr. Ann.* 75, No. 11:478-479; March, 1928.

Paraffin packs have their peculiar indication like the other well known thermal appliances. The physical properties of the paraffin explain the fact that in spite of the strikingly high temperatures, the skin is not highly heated and an irradiation of the thermoregulatory tracts is avoided, that is to say an intense, long and deep warming of the tissues is obtained. The author uses the preparation "ambrine." It is heated in an electric pot, thickly spread in the place to be treated with a creamy depilatory at a temperature of from 80 to 100 degrees following depilation and finally fastened with a flannel bandage. The pack is kept for five hours. Beneath the pack occur hyperemia, slight sudation and compression of the limb. Cutaneous troubles have never been observed. The correctly applied paraffin pack can favorably influence swellings, pains and rigidity in arthritis, myalgia and neuralgia, although not more rapidly nor better than do other physical procedures. The advantages of this procedure are its cheapness, cleanliness and probable suggestive effect.

**Zur Radiumbehandlung Der Boesartigen Geschwuelste.** (On the radium treatment of malignant growths.) Claude Regaud. *Med. Klin. Ann.* 25, 16:608-611, April, 1929.

At the Paris Radium Institute under the author's direction the following methods are applied:

- (1) The introduction of radioactive tubes into, and around the tumor mass through the skin or mucous membrane (radiumpunctura).
- (2) Introduction of radioactive tubes into a surgically produced cavity (radium surgery).
- (3) Introduction of radioactive tubes into the natural passages (internal curietherapy).
- (4) The irradiation through the skin or mucous membrane by means of radioactive tubes fastened to a plastic, mouldable carrier.
- (5) The transcutaneous irradiation at distance by means of a potent radium focus.

Of these methods radium surgery is but rarely applied and resorted to for the treatment of epitheliomata of the paranasal sinuses. (Carcinoma of the upper jaw.) Regaud utilizes radium and its disintegration product, the radon, as radioactive substances; the latter is only used for charging the radium needles.

Radiumpuncture is chiefly resorted to in the treatment of epitheliomata of the tongue and floor of the mouth. The transcutaneous curietherapy with plastic apparatus is used where it is necessary to work at

variable focal skin distances and to arrange more or less numerous tubes by files in order to obtain an irradiation surface adapted for the growth, for instance in epithelioma of the lips. Internal curietherapie has achieved very good results in carcinoma of the cervix uteri due on the one hand to the histological nature of this epithelioma favorable for irradiation therapy, and on the other hand its site amidst radioresistant organs (uterus, vagina). Regaud obtained in the year 1926 39 per cent of cures.

The importance of the transcutaneous curietherapy at distance is increased by the fact, that larger amounts of radium are available, since the Belgian Congo State is bringing larger amount of radioactive substances to market. The appliance of powerful radium sources is to be welcomed insofar as the greater penetrating power of the gamma rays as compared with the most penetrating x-rays permit a finer selection. Hence results the superiority of the gamma rays in case of certain cancer types, as epidermoid carcinomata. It would be hasty, however, to decide on the inferiority of the x-rays in practical respect, for:

- (1) Radium is too expensive to replace the x-rays entirely.
- (2) Seemingly the technic of roentgen machines and roentgen tubes is very far from having exhausted all the possibilities of higher evolution.

The irradiation treatment of the gullet and larynx occasionally proves a failure as the rays provoke lethal lesions in the adjacent organs (heart, aorta, trachea, bronchi, lungs) and in the cartilages of the larynx.

**Untersuchungen Ueber Die Wirkung Der Kohlensaure Auf Den Menschlichen Koerper.** (Investigations into the effects of carbon dioxide on the human body). Kretschmer and Wessel. *Zeitschr. f. d. ges. Physik. Therapie*, 36:117-122, April, 1929.

The authors have compared the influence of carbon dioxide inhalations and carbon dioxide baths in which however, the inhalation of carbon dioxide was impossible. They succeeded in ascertaining the same increase of the alveolar carbon dioxide tension in the arterial blood and alkali reserve. This is, however, only possible if carbon dioxide in the gas baths is absorbed through the skin. As the increase of the alkali reserve proves the increase of the buffer capacity of the blood, it is to be supposed that the favorable action of the carbon dioxide gas baths and also of carbon dioxide mineral springs is due to this increase of the buffer capacity. The poor elimination and neutralization of acids—particularly of lactic acid—in diseases of the heart and vessels is thus promoted.



**Indikationen Und Kontraindikationen Bei Der Entsendung Der Kinder Zur Erholung Ans Meer Und Ins Gebirge. (Indications and contra-indications as to the sojourn of children at the seaside and in the mountains.) Leopold Moll. Monatsschr. f. Kinderheilkd. 42:355-360, 1929.**

Moll enumerates the following contra-indications to sojourn at the seaside: Otitis with perforation of the ear-drum or with constant otorrhoea, open tuberculosis of the lungs and laryngeal tuberculosis. Recent pleurisy and peritoneal tuberculosis, too, are not favorably influenced at the seaside; the same is true of articular rheumatism; diseases of the kidney and renal pelvis, and poorly compensated heart failures, particularly all troubles connected with stasis in the pulmonic circulation are contra-indications to a sojourn at the seaside.

Indications for the sojourn at the seaside are cases of chronic joint tuberculosis. Sun baths and open air treatment on the shore and burying the joints into the hot sand are very efficient. Bone tuberculosis of every kind should go to the seaside. A special indication is childhood anorexia or want of appetite, in which case it is advisable to change the surroundings and to establish the child in a "home" along with other children of the same age. Particularly favorable results are obtained in chronic eczema and exsudativelymphatic manifestations. Scrofula, too, gives a special indication for the stay at the seaside; the same is true of adenopathy, particularly the hypertrophied bronchial glands.

Children with parenchymatous affections of the lungs or bronchial asthma, neuropathic, asthenic children and children with torpid habitus, frequently suggestive of endocrine disturbances, are amenable to a stay in the mountains. For children with marked anaemia the recovery in the mountains is very satisfactory, because the rarefaction of the high mountain air always associated with a decrease in the atmospheric oxygen tension exerts a stimulation of the hematopoietic organs.

**Akratothermen Und Nierenfunktionen. (Natural baths and renal functions.) F. Kornmann. Zeitschr. f. wissensch. Baderkunde, 7:635-638, April, 1929.**

Up to now the possibility of influencing disturbances of the renal functions has generally been explored only by drinking cures of mineral waters. Mineral waters represent a vigorous complex of stimuli and act chiefly on the total diuresis. Their well-founded indications and success are to a large extent due to extra-renal processes. The author, however, has especially studied the renal processes, the proper functions of the kidneys, for which purpose a complex of fine mild acratothermic stimuli aided by an emanation component is chiefly used, and because of this reason disturbances due to severe lesions were excluded. The experiments have been made with the water of the Pfäfers source at Ragatz, Switzerland. The hope to influence abnormal renal functions favorably by an acratotherm in the

form of a bathing cure, has indeed come true. The capacity of the kidneys for dilution and concentration of water, sodium chloride and nitrogen, whether they are or not flooded with these substances, has been tested. It is especially the sodium chloride function which represents an exact criterion for the renal activity. In the majority of cases the bathing cure led to a distinct improvement or recovery of the renal functions. The most favorable effect was produced on the capacity for concentration of salt, and on the readiness of the water and dilution test. The improvement in case with stasis was an especially striking oliguria, and the diminution of the sodium chloride concentration disappeared. The improvement was also a striking one in cases of compensatory genuine hypertension, where the excretory function of the kidneys is frequently damaged. This improvement is not solely to be ascribed to an effect on the cardiac activity. The favorable action equally consists in influencing the circulation of the capillaries and tissues, thus improving the excretion of the metabolites, besides acting on the heart and effecting a change of the physico-chemical electrolyte conditions and the vegetative reactions.

**Die Physiologische Wirkung Der Kohlen-säurebaeder. Ein Rueckblick und Ausblick. (The physiological action of carbon dioxide baths. Foresight and retrospection). Franz Groedel. 44 congress of balneologists, Berlin, 24-29. January, 1929. Zeitschr. f. Kreislaufforschung Ann. 21, 5:144, March, 1929.**

All the theories heretofore advanced about the cause of the specific actions of carbon dioxide baths in cardiovascular troubles have been unsatisfactory. The vegetative nervous system certainly is a point of attack and quite as certainly is this system in a specific manner influenced by carbon dioxide baths, partly by the nerve endings of the skin surface, partly by the intracutaneous action of the carbonic acid. Another important specific action of the carbonic dioxide baths has now been found by Groedel and his collaborators. He carried out a large number of investigations into gaseous metabolism of people with sound hearts as well as of subjects with circulatory troubles and could prove that carbon dioxide baths, in contra-distinction to all other balneotherapeutic measures, exert an excessively marked action on the respiratory metabolism, which cannot be obtained by any other method of treatment. Whereas the absorption of oxygen in the bath is only inappreciably and but transitorily increased, the expiration of the carbon dioxide rises to a great extent. This rise persists for hours after the bath. Whether this carbonic acid enters the body through the skin or is derived from the carbonic acid stores of the body tissues, a large amount of carbon dioxide is on the move through the blood during and after the carbon dioxide bath. The enhanced passage of gases through the blood with its resulting facilities for the circulatory apparatus is, according to Groedel's view, the principal efficient factor of the carbon dioxide baths.

**Ueber Moderne Rheumatismusbehandlung.**  
(On modern treatment of rheumatism.)  
Ernst Freund. Wiener klin. Wochenschr.  
Ann. 42, 11:331-335, Mch. 1929.

In the modern therapeutics of joint diseases physical therapy must be administered. The application of heat in the most various manners is very old nor is it lacking in modern therapeutics. The thermic treatment, however, must not be prescribed without differentiation. One of the most important decisions to be made refers to whether the thermal application has to be a general or local one in the individual case. In general in variable and migrating affections, especially in polyarticular diseases, polyneuralgias and polyneuritis, general treatments are advisable, such as general incandescent light baths, vapor and hot air cabinet baths. Of late transcutaneous baths are frequently applied, which exert a chemical stimulation in addition to a thermal one. Intense stimulants of the skin are added, apparently volatile oils and methyl salicylate. Lather or foam baths where the water is mixed with saponin, these owe their effect to thermic stasis. They are very pleasant to take. The saponin is caused to lather by compressed air, carbon dioxide or oxygen and then strained through fine, porous wood. Also the paraffin baths originally recommended for reduction are used in rheumatic affections. A similar mechanism, namely, supply of heat and thermal stasis, though in a much higher degree, is peculiar to mud packs and are particularly efficient in sciatica, lumbago, arthritis reformans. Besides the treatment with vapor douche, alternately warm and cold and jet douches, in the less severe cases of lumbago and sciatica the sollux lamp may also be used to great advantage.

Diathermy is particularly indicated in cases requiring more or less circumscribed application and where only one or a few articulations are involved. The best indications are given by arthritis deformans and gonorrhoic affections of the joints. A particular advantage of diathermy lies in the possibility of its being ordered unhesitatingly for sensitive and old people who frequently do not tolerate any other thermic applications. Of late small high frequency apparatuses are frequently used which have no great deep effect and are chiefly used in slight neuralgias, neuralgic paraesthesias and functional troubles.

An important field has fallen to electrotherapy. are here often seen in muscular rheumatism as well as in occupational neuroses and some torpid affections of the joints.

Finally stimulant irradiations with the quartz mercury lamp are to be administered. They are strong irradiations which result in an intense skin reaction and often achieve a very good effect, particularly on neuralgias, myalgias and also on the radiating pains due to spinal diseases. The x-ray irradiation will, of course, mostly not suffice in rheumatic affections, yet it is an important adjunct in the treatment of neuralgias, chronic and deforming arthritis. Roentgen rays exert an anodyne and antiphlogistic influence.

**Versuche Einer Beeinflussung Des Ulcus-Leidens Mittels Grenzstrahlen.** (Attempts at influencing gastrointestinal ulcers by means of borderline rays.) (Grenzstrahlen). Willy Gertz. Strahlentherapie, 32:489-503, May, 1929.

Gertz has submitted 50 cases of ulcers and gastritis to treatment with border-line rays. After tentative experiments under control of the leukocytes and under observation of the irradiated skin areas by the capillary microscope, Gertz has arrived at an irradiation scheme, such as Bucky describes as qualified for general irradiations. On each of three consecutive days one-third dose equal to 400 R. was administered on the epigastrium, the superior portion of the back, on the hypogastrium and the inferior portion of the back continuously. Repetition at four days' interval. In some cases Gertz selected two fields more on the level of the collar bone and between the shoulder blades. Generally the Sippy cure is applied. Apart from the usual doses of bicarbonate of soda falling under the compass of this cure, further medication and, of course, also protein therapy were foregone. The irradiation procured the patients quick relief from pain and lasting improvement. A repetition of the whole course takes place immediately if pain is still complained of, otherwise only when mixed diet is tolerated. In regard to the effect, border-line rays and protein therapy are equivalent, according to Gertz; in both cases the stomach receives impulses via vegetative nervous system.

**La Diathermo Therapie Dans Le Syndrome "Pericolite Droite."** (Diathermy in the syndrome of "right-handed pericholitis.")  
Presse Med. 37:93-95, 1929.

In 21 patients out of which only four had not been operated on before the onset of the diathermotherapy, the authors obtained 13 failures and eight successes.

The resulting improvement was not due to the removal of the adhesions, in fact, these adhesions could not be removed by this or any other therapy. The authors depended on the subjective feeling of the patients and the relief of pain over a long period of time. Ten out of the 21 cases were favorably influenced.

The efficiency of diathermic treatment in relation to pain is obviously in the direct ratio to the age of the affection, while the risk of failures depends in part on the degree of the neuropathic, acquired or constitutional condition.

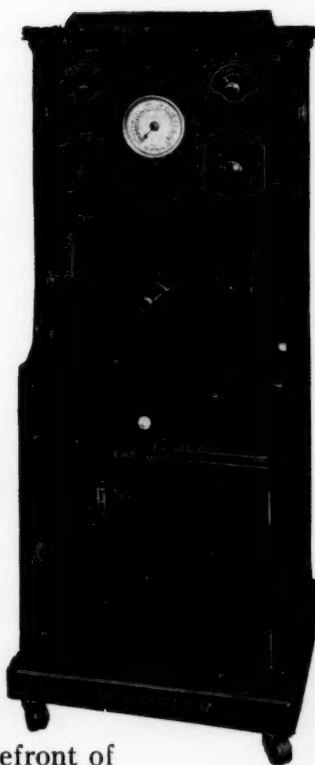
Diathermic treatment requires a supplementary cure by as much rest as can be given, appropriate dietary and preservation of the bowels. Autovaccine prepared from the faeces of the patients may also be tried.

The technic observed in the treatment of pericholitis was in general as follows: Treatment every other day, 1800-2300 ma., time of treatment 20-30 minutes, 20 treatments an average for the first series.

The diathermy treatment was given up when subjective improvement did not appear after 20 or at the most 36 regular exposures.

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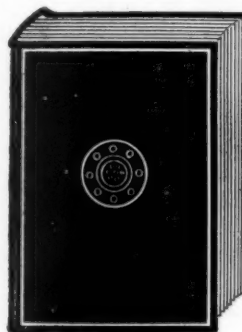
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